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No. 8

IN TWENTY YEARS.

THE UNITED STATES WILL BE THE GREATEST SHIP BUILDING COUNTRY IN THE WORLD—THIS IS THE OPINION OF MR. COLLIS P. HUNTINGTON, HEAD OF THE NEWPORT NEWS SHIP YARD—OPERATIONS OF THE BIG SOUTHERN PLANT.

No ship building establishment in this country has ever had anything like the amount of new work, either in vessels of war or merchant ships, that is now under way at the works of the Newport News Ship Building & Dry Dock Co. at Newport News, Va. With a view to publishing in the near future some reliable information regarding the present extensive operations of this company, a representative of the Marine Review is now at Newport News. He was fortunate enough to find there Mr. Collis P. Huntington, who is not only the moving spirit in the ship yard enterprise, but who has also had much to do with almost everything pertaining to the advancement of the southern district in which the ship yard is located. A brief telegram from the Review's representative, prompted by an interview with Mr. Huntington upon arrival at the ship yard, will prove interesting. Mr. Huntington evidently had in mind the great labor involved in developing the Newport News plant, with a scarcity of orders for several years, when he said:

"My experience this year has entirely justified my judgment in establishing the Newport News yard and in maintaining the best possible organization under adverse circumstances. I would rather lose \$100,000 a year than shut down and turn 5,000 men adrift and then try to get them together again. On each of four ships now building, each costing \$600,000, all but \$60,000 will go for labor and material. On four ships for which I got \$2,000,000 I made only 3 per cent. On three other ships, on which I expected to lose \$50,000, the loss was \$60,000. The Hanna-Payne shipping bill ought to pass, but it will not pass at this session. As for the naval bill, I am in favor of a large navy, not because I am a ship builder, but on general principles. I believe that inside of twenty years America will be the greatest ship building country in the world. Material is constantly getting cheaper here, while in England the problem of raw material is constantly becoming more serious. We contemplate no improvements here at present, except the new dry dock, piers and crane, now under way."

It is now announced unofficially (not in the foregoing interview with Mr. Huntington) that the two Pacific Mail Line steamships, for which contracts were placed recently with the Newport News company, will each be of 18,500 tons displacement, and will therefore be the largest ships ever built in this country. This displacement is quite close to that of the Kaiser Wilhelm der Grosse, the largest ship now afloat. Dimensions of the Pacific Mail Ships as now announced are: Length, 550 feet; beam, 63 feet; draught, 31.5 feet. The speed is to be 18 knots.

With these new vessels coming on and with more government work in sight, the Newport News yard will certainly be for three or four years to come one of the busiest ship building plants in the world. Arrangements are being made for the launching of three of the Morgan Line steamers—vessels of 4,500 tons displacement each—about March 15. These are ships for the coastwise service between New York and New Orleans, all three of them after the same plans. It has not been decided as yet whether to launch the three on the same day or distribute the work over several days. Keels for another Morgan liner and for two large passenger and freight steamers for the Cromwell Line will be put down immediately on the blocks vacated by the steamers just referred to.

One branch of the Minnesota legislature has discarded the bill providing for a bounty of 50 cents a ton on pig iron manufactured in the state from ore mined in the state. The other branch might as well follow suit. A bounty of twice 50 cents a ton would not cause a blast furnace industry of any account to be established in Minnesota. It is not the place for the profitable assembling of raw materials and distribution of manufactured products. Minnesota will probably have a share of the steel and iron industry some day, but not now.

Referring to the report that Frank E. and F. A. Kirby of Detroit were negotiating with the Wm. Cramp & Sons Ship & Engine Bldg. Co. of Philadelphia with a view to entering the employ of that company, a Detroit gentleman who is very close to Frank E. Kirby says: "There is nothing in the story. Frank E. Kirby has had considerable to do with the Cramps of late on account of his work with the government in relation to the rebuilding of army transports. The visit of a representative of the Cramps to Detroit a few days ago was in connection with this work."

The speed record for cruisers was won last week by the Japanese cruiser Chitose, built at the Union Iron Works, San Francisco, Cal. On her official trial outside San Francisco harbor, the Chitose, in a run of 2 hours and 45 minutes, averaged 22.87 knots an hour, the highest speed attained being 23.76 knots.

GRAIN BILL OF LADING—BUFFALO MARINE.

Buffalo, Feb. 22.—The local programme of marine and allied business is large just now. Pursuant to the fixing of the bill-of-lading meeting, to be held here March 7 and 8 and possibly running also into the 9th, circulars have been sent out this week to all commercial bodies that might wish to be interested, asking them to send representatives. The commercial organizations of such centers as New York, Philadelphia and Chicago have been asked to send three members each and the elevator interest of Chicago is expected to be represented separately. The invitations to Duluth are to elevator men separately from the grain interests, in case they desire a separate representation. The arrangement is for the Lake Carriers' Association to come together on the 14th and for the shipping interests to meet the vessel men in joint session on the 8th. It does not seem to be understood whether the shipping and elevating interests will come out very generally or not, but judging from the rather violent document issued by some of these interests in New York not long ago, claiming that a great wrong was contemplated and that bills of lading which lessened the liability of the vessel in shortages would be much less negotiable than the present one, it looks as though the attendance would be good.

The Tonawanda Iron & Steel Co. is looking for a fleet of its own. Manager Rodgers said today that the company was sending out inquiries for vessels and would buy a small number, though possibly not enough to carry all the ore needed. This ore has been secured already. Vessels to trade with Tonawanda must draw not more than 14 feet, and so the older sort of wooden craft will be bought. There is a difference of opinion as to whether wooden vessels have increased in value along with the steel ones. Some say not and others are of the opinion that all classes ought to go up together, especially as the wooden vessels are now becoming scarce.

There is a stir in the direction of setting up a steel plant here, though the movement has not yet taken definite shape. For a considerable time people with the interest of this port in mind have been asking experts why it was cheaper to rail ore to Pittsburg and then carry it to the seaboard over the mountains, when it could all be landed at the furnace from the vessel here and loaded into an ocean steamer with another handling. The answer was that fuel was so much cheaper in Pennsylvania. At last an expert, with a steel plant at his back, went to figuring. He offset the cheaper haul against the cheaper fuel and now says that steel can be made here at a profit, but it will cost \$6,000,000 or so to get started. With our banks running over with money there is capital enough and it is claimed by the enthusiasts that a plant will be established here inside of a year.

The shut down of winter that caught so many cargoes of coal on the way to the upper lakes was not such a bad thing for some of the shippers after all. The Reading company had to tie up the big barge Hartnell at Detroit with, as luck would have it, 5,000 tons of chestnut coal on board, and the Delaware & Hudson had a cargo of the same size laid up in the Iron Duke at Lorain. Then came on the crying scarcity of this size and these cargoes are now being sold locally at a price a full dollar a ton more than could have been realized for them had they gone on to destination. The entire freight has been paid very cheerfully.

Prospects of early shipment of coal from this port are very small at present. The cold weather of the early part of the month took practically every ton that most of the shippers had and it reduced the small stocks held by the others. The eastern market is so very firm that it is going to take a larger percentage of the output of anthracite than usual, so that there will be no eagerness to ship west any more than is really needed.

TO SELL SOME OF THE AUXILIARY SHIPS.

The navy department is preparing to dispose of several yachts and tugs, and a couple of ferry boats, purchased during the late war, and which are of no use now to the government. But the vessels which it is proposed to sell form only a small part of the auxiliary naval fleet. A joint resolution of congress, dealing with the proposed sale, requires due advertisement, and provides that none of the vessels shall be sold for less than appraised value, unless the president shall otherwise direct in writing. Among the vessels listed for sale are the following:

NAME.	Character.	Cost.	Approximate tonnage.
Governor Russell.....	Ferryboat.	\$71,000	Tons. 750
East Boston.....	"	57,500	782
Scipio.....	Steamer.	87,500	3,385
Hawk (formerly Hermione).....	Yacht.	50,000	270
Oneida (formerly Illawara).....	"	55,000	118
Restless.....	"	29,000	105
Siren (formerly Eugenia).....	"	40,000	110
Seminole (formerly Kate Jones).....	Tug.	25,000	122
Chickasaw (formerly Hercules).....	"	15,000	142
Cheyenne (formerly Bristol).....	"	20,000	140
Enquirer.....	Yacht.	80,000	136
Viking.....	"	30,000	141

Two important features of that part of the naval appropriation bill providing for new ships were stricken out while the bill was under consideration in the house Tuesday. One provided that no more than two battleships, two armored and two protected cruisers, should be built at one yard, and the other provided that no bid for the construction of ships should be entertained from any firm or company which had not at the time of building an adequate plant. Both went out on points of order.

SAULT STE. MARIE CANAL.

SOME RARE PICTURES OF THE OLD STATE LOCK, WITH A HISTORICAL RESUME OF THE DEVELOPMENT OF THE CANAL, THROUGH WHICH THERE IS PASSED MORE TONNAGE THAN THROUGH ANY OTHER ARTIFICIAL WATERWAY IN THE WORLD—BUSINESS AT THE SAULT IN THE OLD DAYS.

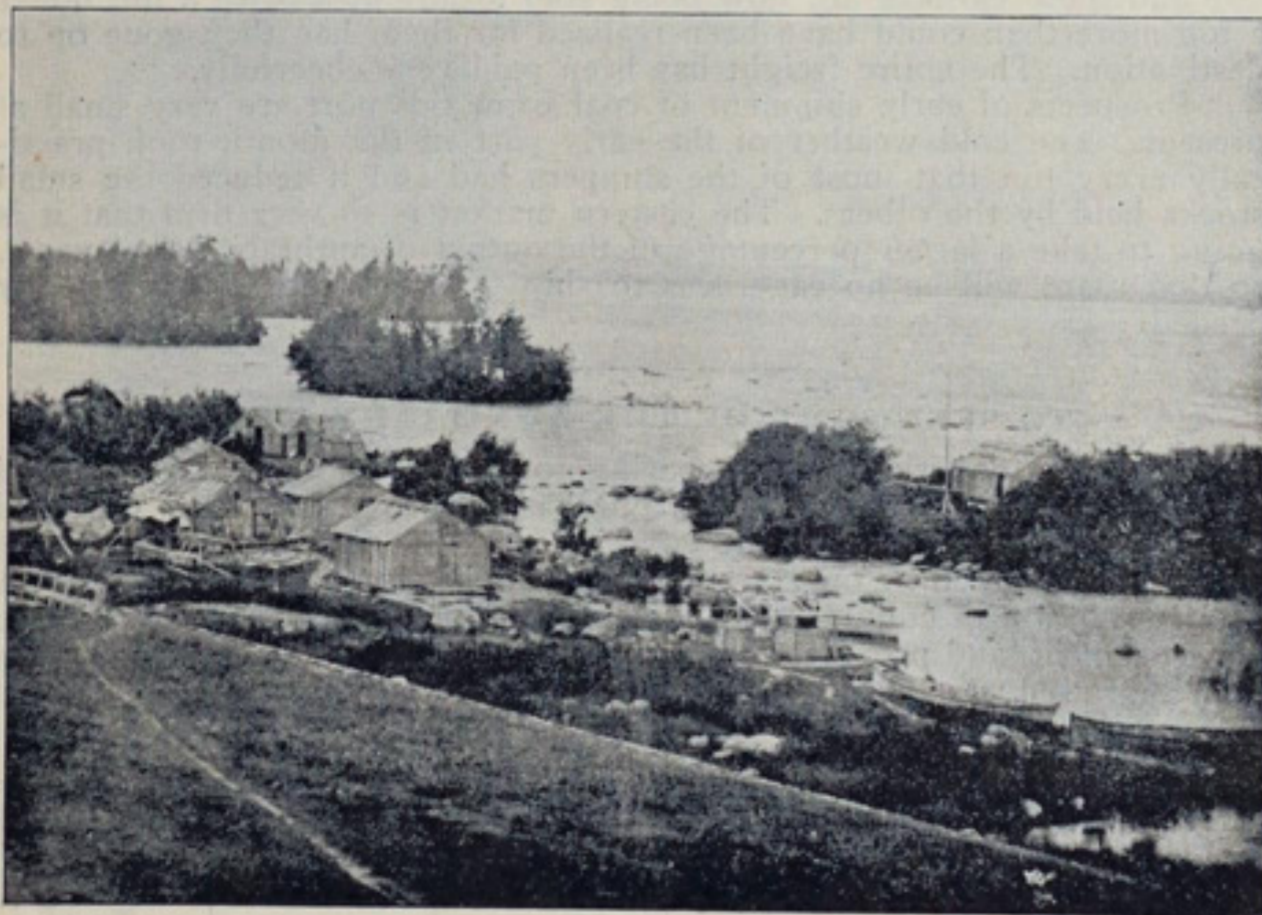
Through the courtesy of Mr. Charles H. Spaulding of Sault Ste. Marie, Mich., son of Capt. John Spaulding, the last superintendent of the old state lock at that place, the Review is enabled to offer the first presentation of rare old photographs of the state lock, taken in 1870, and also a view north of the lock showing the Indian village and rapids at the Sault as they then appeared. As a matter of contrast there is reproduced in conjunction therewith a recent photo of the present 800-foot dock in the United States canal at Sault Ste. Marie, through which there is passed in less than eight months of navigation each year more tons of freight than is transported in a full year through any other canal in the world, not excepting the Suez. The number of freight tons (2,000 pounds) passed through both canals, Canadian and American, at the Sault in 1898 was full 2,250,000.



CAPT. JOHN SPAULDING.

The history of the development of the United States canal at the Sault, although extending over little more than half a century, is an extremely interesting one. The attention of the people of Michigan was first publicly called to the importance of securing a ship canal around the rapids at Sault Ste. Marie by Governor Mason in his message to the legislature in 1837. This was the first session of the legislature as a state, it having been admitted to the union during the previous year. It is believed that the project had been agitated even earlier when Governor Mason was secretary and acting governor of the territory. The legislature acted favorably upon the governor's recommendation, and an act was passed authorizing a survey and appropriating \$25,000 for the purpose.

During the following summer Engineer John Almy submitted plans for a canal with two locks of the following dimensions: Width of canal, 75 feet; depth, 10 feet; width of locks, 32 feet; length, 100 feet; depth, 10 feet; estimated cost, \$112,544. In 1838 the legislature, upon the suggestion of Governor Mason, made another appropriation of \$25,000 for the purpose of beginning construction, and on Sept. 7, 1838, a contract was entered into at Detroit, with Smith & Driggs of Buffalo to construct the

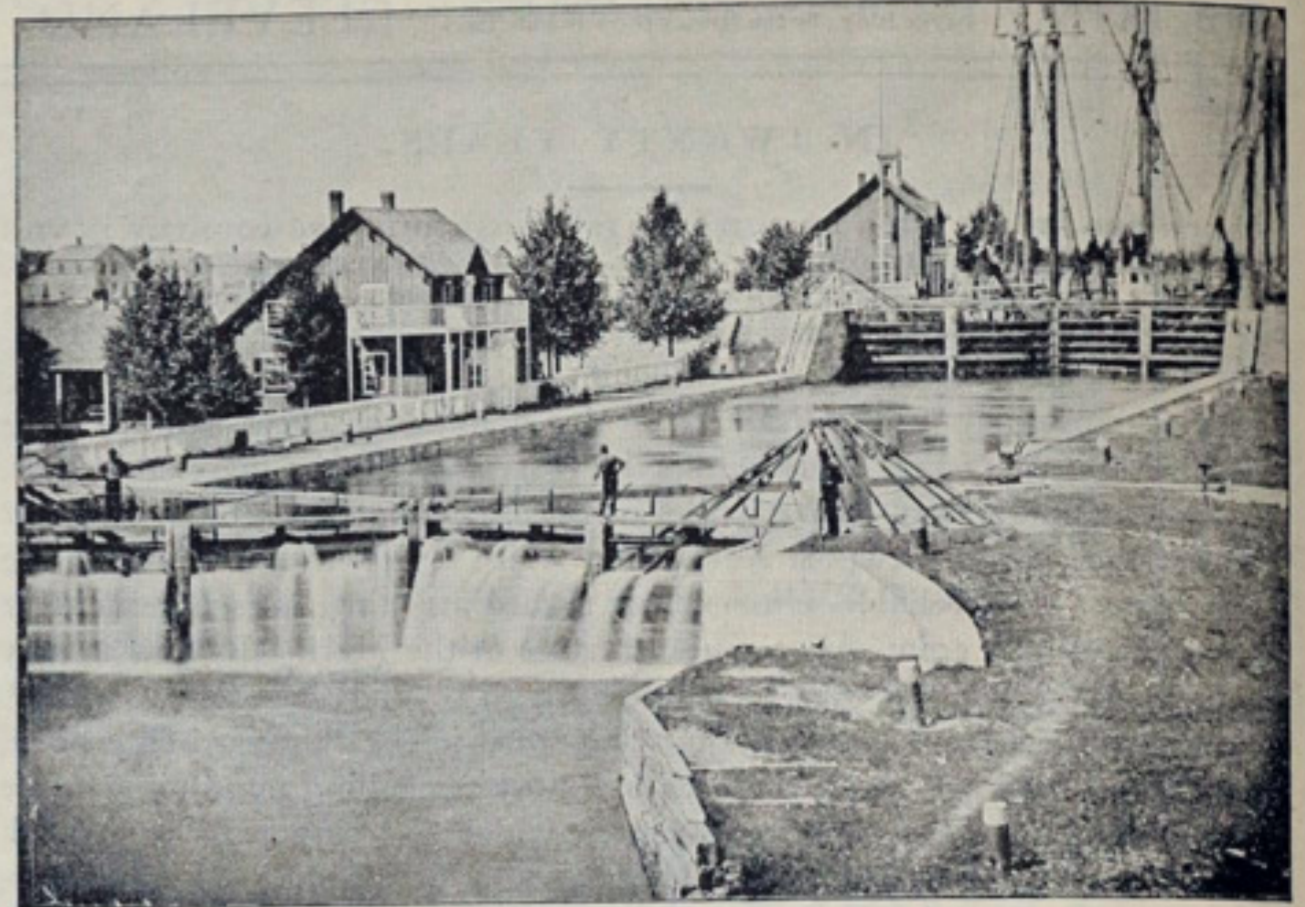


INDIAN VILLAGE AND RAPIDS AT THE SAULT, 1870.

canal. Work was begun early in May, 1839, by filling up a government mill race, located upon the military reservation. Then followed a lengthy wrangle between the state authorities and the post commander at the military reservation. The matter finally came up in congress in the form of a proposition to make a grant of 100,000 acres of land to aid in the construction of the canal, but it was defeated, Henry Clay, one of the opponents of the measure, declaring it "a work beyond the remotest settlement of the United States."

It was a long fight before aid was finally secured from congress, but the utter inadequacy of the plank and tram road transfers at the Sault finally interested so many men in the agitation that in 1852 a bill was gotten through providing for a grant of 750,000 acres of land for the construction of the canal. Thus after sixteen years of labor a contract was entered into with a number of gentlemen to construct the canal and defray all expenses connected therewith for the land appropriated by congress. They further agreed to complete the work within two years. In framing this contract some very important changes were made in the

original plans. The contract as finally entered into provided for the construction of two consecutive locks, 350 feet long, 70 feet wide and 12 feet depth, which latter was afterward increased to 13 feet. The canal was to



OLD STATE LOCK AT SAULT STE. MARIE, MICH.

be 100 feet in width and the estimated cost was \$557,739. Later the St. Mary's Falls S. Canal Co. was organized. The actual cost of the canal proved in the end to be \$999,802.46.

Water was first let into the canal April 19, 1855, and on June 18 of that year the first boat locked through. The vessel was the steamer Illinois in command of Capt. R. Wilson. Although the canal as constructed

COMMERCE OF THE OLD STATE CANAL AT SAULT STE. MARIE, MICH.—TRAFFIC STATISTICS, 1855 TO 1878 INCLUSIVE.

Years.	Gross Receipts.	Tonnage.	No. of sail vessels.	No. of steamers.	Opened.	Closed.
1855	\$ 4,374.66	\$106,296.00	.....	.....	June 18.	Nov. 23.
1856	7,575.78	101,458.00	.....	.....	May 4.	Nov. 28.
1857	9,406.74	180,820.00	.....	.....	May 9.	Nov. 30.
1858	10,848.80	219,819.00	.....	.....	April 18.	Nov. 20.
1859	16,941.84	352,642.00	.....	.....	May 3.	Nov. 28.
1860	24,777.82	403,657.00	.....	.....	May 11.	Nov. 26.
1861	16,672.16	276,639.00	.....	.....	May 3.	Nov. 14.
1862	21,607.17	359,612.00	.....	.....	April 27.	Nov. 27.
1863	30,574.44	507,434.00	.....	.....	April 28.	Nov. 24.
1864	34,287.31	571,438.00	1,045	366	May 2.	Dec. 4.
1865	22,339.64	409,062.00	602	395	May 1.	Dec. 3.
1866	23,069.54	458,530.00	555	453	May 5.	Dec. 3.
1867	33,515.54	556,898.76	839	466	May 4.	Dec. 3.
1868	25,977.14	432,563.47	817	338	May 2.	Dec. 3.
1869	31,579.96	524,884.72	989	399	May 4.	Nov. 29.
1870	41,896.43	690,825.91	1,397	431	April 29.	Dec. 1.
1871	33,865.45	752,100.54	1,064	573	May 8.	Nov. 29.
1872	41,242.44	914,735.03	1,212	792	May 11.	Nov. 26.
1873	44,943.18	1,204,445.54	1,549	968	May 5.	Nov. 18.
1874	38,923.97	1,070,857.18	833	901	May 12.	Dec. 2.
1875	41,199.04	1,259,533.53	569	1,464	May 12.	Dec. 2.
1876	39,315.33	1,314,195.08	571	1,529	May 8.	.....
1876a	7,551.97	227,481.20	113	204	.....	Nov. 26.
1877	44,351.43	1,439,215.71	1,401	1,050	May 2.	Nov. 30.
1878	49,437.00	1,567,136.00	1,476	2,567	April 8.	Dec. 3.

a, Shows the business from Sept. 30, 1876, the date of the last report, to the close of navigation that year.

was nearly four times as large as was contemplated by its original projectors in 1837, so rapid was the development of Lake Superior commerce that a decade sufficed to demonstrate the necessity for an enlarge-

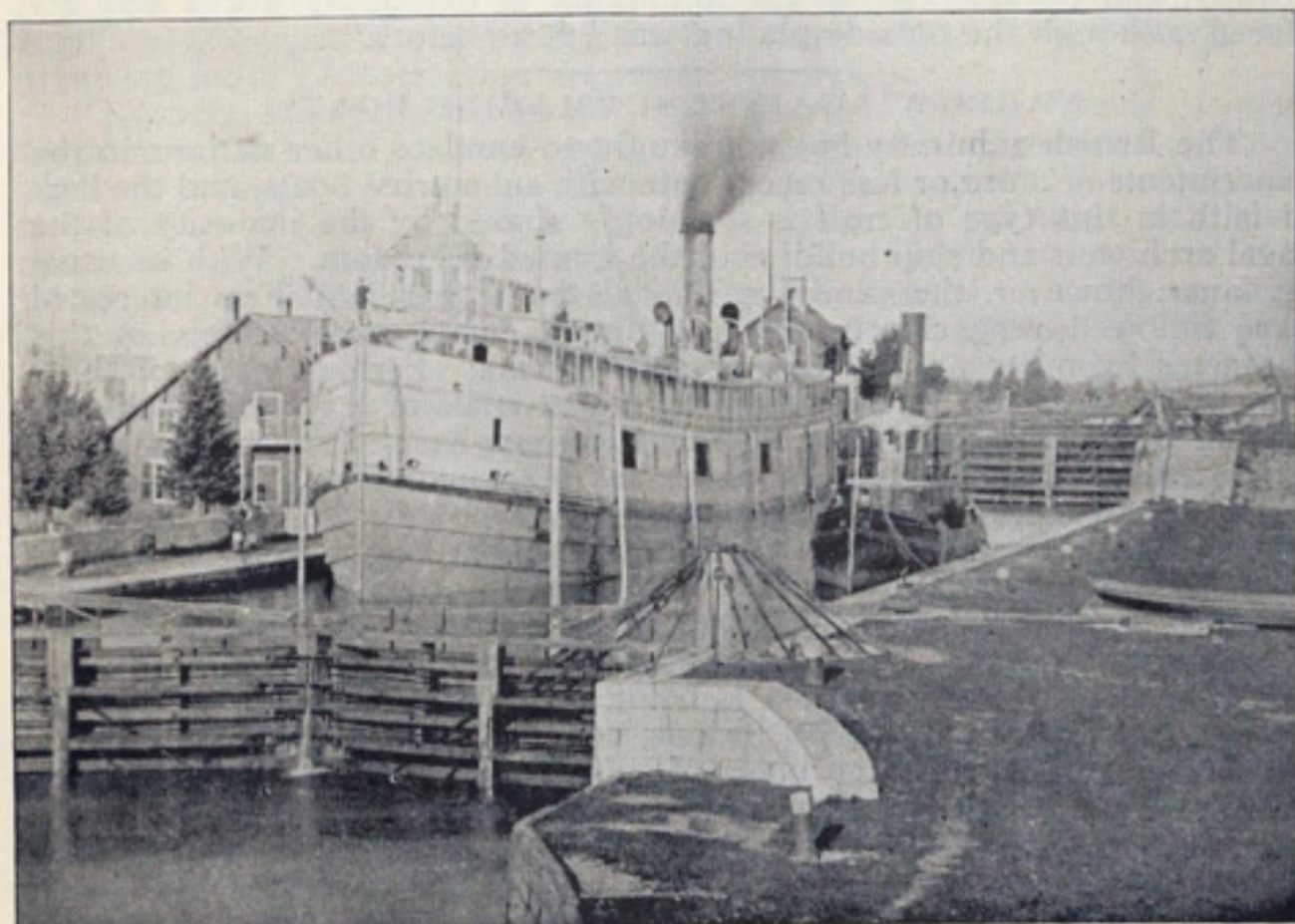


PRESENT 800-FOOT LOCK OF UNITED STATES CANAL AT SAULT STE. MARIE, MICH.

ment of the canal and locks. It was this necessity which led to the agitation looking to the turning of the canal over to the United States government. This was finally accomplished in 1870.

The first contract for improvement under government control was let in Oct. 20, 1870, and the first stone in the walls of what is already

known as the old government lock (Weitzel lock) was laid July 25, 1876. This 500-foot lock, costing about \$2,000,000 and of comparatively modern construction, was in its turn found inadequate, also in less than a decade, and the result was the construction of the 800-foot lock of 20 feet depth, which was completed only a short time ago, and the construction also of a canal at great cost on the Canadian side. The recent development of



PROPELLER LOCKING THROUGH THE OLD CANAL AT THE SAULT.

commerce in these new locks and the progress of other government improvements in the St. Mary's river matters that have been so often referred to in these columns that it is unnecessary to go into detail regarding them. But for the purpose of comparison two tables, one showing the traffic of the old state canal and the other dealing with the great strides that have been made in the Sault commerce of late years, are presented herewith.

ST. MARY'S FALLS CANAL TRAFFIC, 1880 TO 1898 INCLUSIVE.

	Total vessel passages.	Registered tons.	Freight tons, net.
1880	3,503	1,734,890	
1885	5,380	3,035,937	3,256,628
1890	10,557	8,454,435	9,041,213
1895	17,956	16,806,781	15,062,580
1896	18,615	17,249,418	16,239,061
1897	17,171	17,619,933	18,982,755
1898	17,761	18,622,754	21,234,664

Note.—Commerce of Canadian canal included in 1895 and since that year.

MERCHANT SHIPS AN ADJUNCT TO SUCCESS.

The following from the shipping report of Angier Bros., London, shows the importance that our English friends attach to merchant marine shipping as an adjunct to their naval as well as their commercial success:

"The Spanish-American war was of considerable importance to the mercantile marine in this country, affording, as it did, a very lucrative market for the sale of some tonnage and employment at substantial profit, but like all naval wars it also brought to light the great fact which the public generally, and governments as well, have ever been too slow to recognize, namely, 'that a nation's mercantile marine is of equal importance and value with its navy in a big naval war.' Every fresh experience brings to light the multiplicity of uses into which mercantile ships can be brought, not only in the nature of transport and supplies, but even for certain forms of attack and offensive operations. Resourceful men, like all sailors, and especially Americans, find endless uses and transformations for them, quickly effected, marvellously telling. The fact of our possessing 7,000,000 tons of mercantile ships of all kinds, capacities and speeds, ready for our government to requisition at an hour's notice at comparatively moderate cost, besides our navy, would of itself predecide a naval war in our favor, against a combination of fleets of warships equal to our navy, but backed up only by such mercantile fleets as other powers of the world possess. No navy is at the present age worth its proper fighting value without a sufficient mercantile fleet to second it. The great fact, too, that the millions of inhabitants in these islands depend entirely on the mercantile navy for their every daily want, their very existence, all the above named vital points should awaken the attention of our public, and enlist their steady weighty insistence on every government, helping and encouraging by every means the national mercantile ships instead of hampering and worrying the industry by effete and tinkering legislation as has too often heretofore been the case."

A lively debate will probably attend the consideration of bills now before congress for the relief of the Wm. Cramp & Sons Co. of Philadelphia for losses due from delays by the government in supplying armor for war vessels. The claims aggregate \$211,018 in the case of the cruiser New York, \$102,235 in the case of the Columbia, \$483,757 for the battleship Massachusetts and \$480,231 for the battleship Indiana, or a total of \$1,367,241.

Mr. Clark Russell, well-known maritime writer, is contributing a very interesting series of articles on "The Ship" to the Pall Mall Magazine, published at Astor Court building, New York City.

YARROW TORPEDO BOATS.

SOME OF THE SPEEDY CRAFT RECENTLY BUILT FOR FOREIGN NAVIES BY YARROW & CO. ON THE THAMES—REMARKABLE PICTURE OF A JAPANESE DESTROYER.

The Review presents as a supplement to this issue three pictures—two torpedo boats and a torpedo boat destroyer—recently turned out by the English firm of Yarrow & Co. and which may be said to represent the highest attainments of British builders in the construction of torpedo craft. Probably the most interesting photo of the trio is that of the torpedo boat destroyer Ikadsuchi, built for the Imperial Japanese navy. The picture referred to was taken when the vessel was on her preliminary trial and was actually traveling at a speed in excess of 31 knots. The Ikadsuchi is the first of six similar craft built by Messrs. Yarrow & Co. for Japan. She is a twin-screw boat 220 feet long, and 20 feet 6 inches wide, and is propelled by two sets of four-crank triple-expansion engines, which are balanced on the Yarrow, Schlick & Tweedy principle; this method has been adopted with considerable success by builders of larger vessels. It may be added that on the trial of the Ikadsuchi the running was exceedingly steady at all speeds. In each set of engines the high-pressure cylinder is 20½ inches, the intermediate cylinder 31½ inches, and the two low-pressure cylinders each 34 inches in diameter, the stroke being 18 inches. In accordance with the usual practice now followed by this firm, the two low-pressure cylinders are placed at the ends of the set. There are four boilers of the Yarrow straight-tube type.

It will be seen from the illustration that in general appearance the vessel is of the usual type of destroyer built by this firm; but in the internal arrangement there is an important modification in the fact that the officers' quarters, in place of being right aft, as in British vessels, are placed nearer amidships. In the machinery department one or two clever improvements in detail have been introduced. On the trial referred to the contract load of 35 tons was carried, and the contract speed of 31 knots was more than reached during four runs on the mile, without pressing the machinery. The engines are designed to give 6,000 horse power, but it was shown by the trial that an ample margin has been allowed, and it is estimated that 7,000 indicated horse power could be reached if needed. The steam pressure on trial averaged 185 pounds per square inch with easy blowing. The revolutions were 410 per minute, and the draught 8 feet 6 inches. The armament will consist of one 12-pounder quick-firing gun mounted aft, and five 6-pounder guns. There are two torpedo guns on deck for 18-inch torpedoes. The coal capacity is 90 tons, which is amply sufficient to take the vessel across the Atlantic at a fair speed.

Following are particulars of the principal vessels built by Yarrow & Co. during the past twenty-one years:

PRINCIPAL VESSELS BUILT AND ENGINED BY MESSRS. YARROW & CO., 1877 TO 1898.

Date of building.	No. of vessels.	Government built for.	Dimensions.		Number and type of boiler.	I. H. P.	Speed on trial.
			Length.	Beam.			
			ft. in.	ft. in.			Knots.
1877	2	British	86 0	11 0	1 locomotive.	420	20.75
1878	2	French	86 0	10 10	1 "		
1878	1	Spanish	86 0	10 10	1 "		
1878	2	Austrian	86 0	10 10	1 "		
1879	1	British	86 0	11 0	1 "	420	21.94
1879	2	"	62 0	7 6	1 "	150	16
1879	2	Italian	86 0	10 10	1 "		
1879	5	Russian	100 0	10 10	1 "		
1880	2	British	62 0	7 6	1 "	150	16.17
1880	2	Argentine	100 0	12 6	1 "		20
1880	8	Chilian	100 0	12 6	1 "		
1880	2	Austrian	100 0	12 6	1 "		
1881	2	Dutch	100 0	12 6	1 "		22.5
1881	2	Portuguese	100 0	12 6	1 "	500	21
1881	2	Italian	100 0	12 6	1 "	550	22.5
1881	2	Brazilian	100 0	12 6	1 "	500	21
1881	2	Argentine	100 0	12 6	1 "	500	20
1882	4	Brazilian	110 0	12 6	1 "	600	20.5
1884	2	British	113 0	12 6	1 "	750	19
1884	2a	"	75 0	18 0	1 "		
1885	23	"	125 0	13 6	1 "	700	19.5
1885	1	"	129 0	13 6	1 "	1000	22.4
1885	2a	"	120 0	23 0	2 "		
1885	2a	"	80 0	18 0	1 "		
1885	2	Austrian	135 0	14 0	1 "	1200	24
1885	1	Japanese	166 0	19 6	2 "		19
1886	1	British	135 0	14 0	1 "	1500	23
1886	2	Italian	140 0	14 0	2 "	1600	25
1886	2	Spanish	135 0	14 0	1 "	1600	24
1887	1	British	60 0	8 6	1 "	220	17
1887	1	"	56 0	8 3	1 "	200	16
1888	6	"	130 0	13 6	1 "	1130	22.5
1889	10	"	60 0	9 3	1 "	230	16
1889	6	Argentine	130 0	13 6	1 "	1200	24
1890	2a	British	77 0	18 0	1 "	86	10
1892	1b	"	180 0	18 6	2 "	3500	26.1
1892	1b	"	180 0	18 6	8 water tube.	3884	27.6
1892	2	"	142 6	14 9	1 locomotive.	1600	23
1894	3b	"	190 0	18 6	2 "	3200	26
1894	1	French	60 0	9 3	1 water tube.	250	20.5
1895	2	British	142 0	14 6	1 "	1600	23.1
1895	1	Russian	190 0	18 6	8 "	3800	29.75
1895	1	Austrian	147 0	14 9	2 "	2000	26.6
1896	4	Argentine	190 0	19 6	6 "	4000	27
1896	6	Chilian	152 6	15 3	2 "	2000	27
1897	6c	British	100 0	20 0	1 "	250	10.5
1897	2c	Egyptian	145 0	25 6	2 "	450	13
1898	2	Austrian	152 0	15 3	2 "	2000	24
1898	1b	Japanese	220 0	20 6	4 "	6000	31

a, Stern wheelers; b, torpedo boat destroyers; c, torpedo gunboat; all others torpedo boats.

The contract for coal handling machinery for the Mare Island navy yard (California) has been awarded to the Brown Hoisting & Conveying Machine Co. of Cleveland. This is the sixth coaling station to be equipped with this company's machinery. The Brown company has also just secured a contract for a 100-ton steel floating crane for the Brooklyn navy yard.

RAILROAD CONSTRUCTION IN 1899.

The Railroad Gazette contains a list of railroad projects at present proposed or under construction in the United States, Canada and Mexico. The list includes 448 companies, and 480 lines and extensions in the United States, sixty-eight companies and eighty-six lines and extensions in Canada, and twenty-eight companies with twenty-nine lines and extensions in Mexico, a total of 544 companies and 595 projected lines and extensions. The list has been prepared with the object of including only the projects that are likely to take some shape in the near future. The amount of proposed new construction indicates that railroad building, which for a number of years has been neglected, is being revived. Nearly every state in the union contributes to the proposed work, but the greatest activity is shown in the southern states, the north Mississippi states, and the extreme northwest. A distinctive feature of the work in the south is that nearly all of the building is by new companies, showing the infusion of northern capital. On the other hand, in Iowa, Minnesota and the northwest, most of the building is in branches and extensions by old established lines.

EXPERIMENTS WITH A BABCOCK & WILCOX BOILER.

In an article on "The Outlook in Marine Engineering," prepared recently by Com. Geo. W. Melville, engineer-in-chief of the United States navy, the accompanying table of tests was published for the first time. The boiler tested was one of four built by the Babcock & Wilcox Co. for the United States cruiser Atlanta and the tests were conducted by Chief Engineer John Low, U. S. N.

In explanation of the air pressures in the table it should be said that the boiler was enclosed in a structure into which the air was forced by a blower, thus ensuring ample ventilation and a moderate temperature. From this closed fire room the air passed through the air heater or

is believed that the new defender shows an extreme beam of a few inches more than 24 feet, as against only a little more than 23 feet in the Defender. The draft of the boat is expected to be about the same, a little under 20 feet. A larger sail plan for the new boat than the one carried by the Defender is also deemed a certainty. Work is still being done inside the old Defender as she lies at the Herreshoffs' south pier. She was strengthened internally by additional bracing and strapping when she was out on the railway, and considerable of the aluminum in her upper works was replaced, although the outside plating was left as before."

YARROW AGAINST SUBMARINE BOATS.

The British admiralty has not sought to emulate other nations in the experiments of more or less recent date with submarine boats, and the lack of faith in this type of craft is seemingly shared by the majority of the naval architects and ship builders of the United Kingdom. With its usual vigilance, however, the admiralty officials and other Britishers interested have followed very closely the experiments made with vessels of this character by other nations during recent years. Perhaps none of these have aroused greater interest than the recent trials of several French submarine boats, the discussion having been emphasized in the matter of public attention by the secrecy which has been maintained with reference to the construction of the French boats.

The latest denunciation of the submarine boat comes from A. F. Yarrow, the well known English builder of torpedo boats, and whose knowledge of the essential details of the type of construction involved makes his opinion of value. Mr. Yarrow is quoted as saying:

"From the sensation which is being made about submarine boats in France, one would think the idea is new. It is not. For more than thirty years trials have been made of submarine torpedo boats. And the thirty years have been marked by little progress and considerable loss of life. And in this latest attempt by the French the essential objections to

EXPERIMENTS ON SHORE WITH A BABCOCK & WILCOX WATER TUBE BOILER, INTENDED FOR U. S. S. ATLANTA, WITH AND WITHOUT HEATED DRAFT—CONDUCTED BY CHIEF ENGINEER JOHN LOW, U. S. N.—HEATING SURFACE, 1950 SQUARE FEET; GRATE SURFACE, 54.7 SQUARE FEET; RATIO, 35 TO 1; DURATION OF EACH TRIAL, 6 HOURS.

KIND OF DRAFT USED.		Heated.	Heated.	Heated.	Cold.	Cold.
Boiler pressure		200	200	200	184	200
Feed temperature, degrees Fahr.		110	110	110	110	110
Factor of evaporation		1.162	1.162	1.162	1.162	1.162
Average air pressure in inches of water.	Chimney	-0.48	-0.40	-0.27	-0.33	-0.42
	Flue	-0.22	-0.26	-0.26	0.09	+0.07
	Furnace	+0.15	-0.04	-0.24	+0.08	+0.43
	Fire room	+1.05	+0.70	0.00	+0.48	+1.03
	Ash-pit	+0.48	+0.30	-0.12	+0.48	+1.03
Temperatures, degrees Fahr.	Air in fire room (entering air heater)	91	83	161	99	91
	Air in ash pit (leaving air heater)	290	273	311	99	91
Gases in chimney by pyrometer		Lead melted.	Lead melted.	Bismuth melted.	Zinc melted.	Aluminum melted.
Moisture in steam, per cent.		657	545	488		
Dry coal per hour, pounds		00.43	00.65	00.58	00.49	00.57
Dry coal per hour, pounds per square feet of grate, pounds		1558	1199.5	679	1368.7	1813.3
Refuse in coal, per cent.		28.48	21.92	12.41	25.02	33.15
Water evaporated.		10.3	9.8	9.8	9.7	8.23
		8.22	8.56	9.4	8.02	7.62
		9.55	9.94	10.93	9.30	8.54
		10.65	11.02	12.25	10.30	9.31
Per square feet of heating surface per hour f. and a. 212° Fahr.		7.63	6.12	3.81	6.53	8.24
Per square feet of grate 212° Fahr.		271.9	218.1	135.7	232.7	294.6

regenerator and thence by a duct to the closed ash pits. When the air was not heated, the opening to the regenerator was closed and the ash pits were opened.

An examination of the table shows very clearly both the increased evaporation per pound of coal and the reduced temperature in the chimney when the regenerator is in use.

PLATING OF THE NEW CUP DEFENDER.

The newspaper correspondents of Bristol, R. I., who are deprived of official information from the works of the Herreshoffs regarding the new Defender, are watching every move at the ship yard and seem to be well posted regarding changes to be made in the new vessel. The first installment of plate, which arrived at the ship yard a few days ago, is said to have included twenty-five bronze plates and forty-five steel. The bronze plates were carefully crated, but the steel plates were received in the ordinary way in a freight car. A Bristol dispatch referring to the plates says:

"The bronze plating is for the under water body of the yacht, as on the Defender, while the steel is for the portion above the water line, where in the Defender aluminum was used. The bronze plates are 3-16 and 1/4 inch in thickness, and the steel plates 1/8 inch. The bronze plates were in two sizes, the largest being about 18 by 4 feet and the smaller 15 by 2 1/2 feet. There were nine of the large plates, and each had a crate to itself. These plates were very close to 1/4 inch in thickness. The smaller plates came two in a crate, nine crates being used, and were not more than 3-16 inch in thickness. The steel plates were all about 15 feet long, and varied in width from 4 to 2 feet. There are about enough of them to cover the boat from the water line up. Not nearly enough bronze plating has arrived to cover the under water body of the boat.

"Many more bulbed angles than were used in the Defender have arrived, and the indications are that the frames are to be spaced more closely together than in the Defender, whose frames were 20 inches apart. Enough bulbed angles are on hand to make the spacing only 14 or 15 inches. The idea of a closer spacing of frames is borne out by the extreme thinness of the plating. The 1/8 and 3-16 inch plates could hardly be made to stand well at a 20-inch spacing of the frames, but would do well at 15. The Defender's bronze plating was 5-16 inch.

"The new boat promises to be a lighter and stronger boat than was predicted. Designer Herreshoff has succeeded in keeping the smooth bronze surface for the under water body by the means of thinner bronze and closer spacing of frames. Aluminum has been discarded in favor of nickel steel, with a corresponding increase in strength and durability. It

the idea still remain. First of all, these boats are so dangerous that I doubt if competent men will be found willing in time of peace to risk their lives in the necessary practice. Many competent constructors could be found ready and willing to build one of these boats, but I am quite sure not many would venture in it when it was built. These dangers arise to some extent from the fact that the specific gravity of the boat must be either exactly or nearly the same as the specific gravity of the water. The result is that if an indentation was caused in the skin of the vessel, its specific gravity would, of course, become actually greater than that of the water, and it would sink to the bottom. Another danger, which arises chiefly in shallow water, is that the vessel is apt, through the slightest disorder of the steering gear, to get out of the horizontal line. And in that case in less than no time it might stick its head in the mud. This actually occurred a few years ago at Tilbury, where Lord Charles Beresford was nearly drowned. A third danger is that of collision with rocks, fish or pieces of wreckage. If a large fish in some foreign sea came into contact with one of these boats it might easily take charge of the steering gear.

"In my belief they could be of value only against stationary vessels. In the case of a vessel in motion, sufficiently accurate guiding would be impossible. As far as stationary vessels are concerned, submarine torpedo boats which can be guided by electric wire from the shore, would prove quite as effective. With our present knowledge, boats of the French type are both dangerous and ineffective, and, I may add, the more money the French spend upon them the better for the rest."

Hollow-forged, oil-tempered shafts of the Bethlehem Iron Works kind, similar to shafts in the steamer Morse, will be used in the two duplicates of the Morse, for which the Bessemer Steamship Co. (Rockefeller interest) let contracts a few days ago, as well as in the steamer building at the Globe yard, Cleveland, for the same company. This will make four freight steamers of the Rockefeller fleet, all of the very largest type of lake ships, that will be fitted with these shafts.

The factory of the Peerless Rubber Mfg. Co. is being run day and night in order to fill orders on time, the demand for their special line of packings constantly increasing. The celebrated Rainbow packing, Eclipse sectional rainbow gaskets, Peerless piston and valve rod packing, Hercules combination metallic stop valve packing and Honest John hydraulic rainbow core packing is extensively used by all classes of engineers. There were over 1,500 tons of Rainbow packing sold during 1898.

Capt. James McKenzie, veteran vessel master of Buffalo, whose last command was the light-house tender Haze, died at Buffalo a few days ago.

INSPECTION OF SAIL VESSELS.

THOSE OVER 700 GROSS TONS WILL SOON BE CALLED UPON TO COMPLY WITH REGULATIONS SIMILAR TO THE STEAMBOAT INSPECTION LAWS—MASTERS AND MATES MUST BE LICENSED—THE LAW IN FULL.

In accordance with the act of congress approved Dec. 21 last, and which provides for the inspection of sail vessels of over 700 tons and the licensing of masters and chief mates of such vessels, there has been issued from the office of the supervising inspector general of steam vessels the following letter of instruction regarding the new law:

"Owners, agents, masters, and chief mates of sailing vessels of over 700 tons (gross), and of other vessels and barges of over 100 tons (gross), carrying passengers for hire, are hereby notified that, under an act of congress approved Dec. 21, 1898, to take effect on and after July 1, 1899, the classes of vessels above named will have to have their hulls inspected and certificated by the local inspectors of steam vessels at the various ports in the United States where such officers are located and employed. The law referred to also requires that the masters and chief mates of the above described vessels shall be examined and licensed by the local inspectors of steam vessels to entitle them to act in the capacity named; and that it will be unlawful to employ any person or for any person to serve as 'a master or chief mate of sail vessels of over 700 tons who is not licensed by the inspectors.' The penalty for a violation of this requirement will be \$100 for each offense.

"Local inspectors will be prepared to receive applications to examine and issue licenses to masters and chief mates of sail vessels of the tonnage above indicated on or about May 1, 1899. Applications by owners of sail vessels of 700 tons and upward, and of all other vessels and barges over 100 tons burden, carrying passengers for hire, will also receive consideration on and after May 1, proximo. A failure on the part of an owner of any vessel of the classes referred to herein to have the vessel's hull inspected and certificated will subject such owner to a penalty of \$500, under the provisions of sections 4499 and 4500, revised statutes. Rules governing the issue of licenses to masters and chief mates of sail vessels of 700 tons and upward have been adopted by the board of supervising inspectors and approved by the secretary of the treasury as follows:

"Local inspectors may, upon due application, license as masters and chief mates of sail vessels of over 700 tons, upon receipt of satisfactory documentary evidence, to be filed in their office, that said masters or mates have been actually employed as such officers on vessels of the tonnage named for the full period of twelve months preceding the application for license, provided such officers shall be found, upon examination, to be free from color blindness.

"Applicants for master's or for mate's license on sail vessels, who have had no previous service as either master or mate, except on rivers and on the great lakes, must be duly examined in navigation the same as required for masters and mates of steam vessels, such examinations to be in writing, and the applicants must be free from color blindness; Provided, that no master, except as provided in the first paragraph of these rules, shall be licensed who has not served a full term of one year on such sail vessels as chief mate, nor shall any person be eligible to be examined as chief mate of sail vessels unless he can furnish satisfactory documentary evidence that he has had at least three full years' experience on sail vessels of 300 gross tons and upward."

The act of congress referred to in the above rules is as follows:

"Be it enacted, etc., that section 4,438 of the revised statutes be, and is hereby, amended to read as follows: 'Section 4438—The boards of local inspectors shall license and classify the masters, chief mates, and second and third mates, if in charge of a watch, engineers, and pilots of all steam vessels, and the masters and chief mates of sail vessels of over 700 tons and all other vessels and barges of over 100 tons burden carrying passengers for hire. It shall be unlawful to employ any person, or for any person to serve, as a master, chief mate, engineer, or pilot of any steamer, or as master or chief mate of any sail vessel of over 700 tons who is not licensed by the inspectors; and anyone violating this section shall be liable to a penalty of \$100 for each offense.'

"Sec. 2. That section 4439 of the revised statutes be, and is hereby, amended to read as follows: 'Sec. 4439.—Whenever any person applies to be licensed as master of any steam vessel, or of a sail vessel of over 700 tons, the inspectors shall make a diligent inquiry as to his character, and shall carefully examine the applicant as well as the proofs which he presents in support of his claim, and if they are satisfied that his capacity, experience, habits of life, and character are such as warrant the belief that he can safely be intrusted with the duties and responsibilities of the station for which he makes application, they shall grant him a license authorizing him to discharge such duties on any such vessel for the term of five years; but such license shall be suspended or revoked upon satisfactory proof of bad conduct, intemperate habits, incapacity, inattention to his duties, or the willful violation of any provision of this title applicable to him.'

"Sec. 3. That section 4440 of the revised statutes be, and is hereby, amended to read as follows: 'Sec. 4440.—Whenever any person applies for authority to be employed as chief mate of ocean or coastwise steam vessels or of sail vessels of over 700 tons, or as second or third mate of ocean or coastwise steam vessels, who shall have charge of a watch, or whenever any person applies for authority to be employed as mate of river steamers, the inspectors shall require satisfactory evidence of the knowledge, experience, and skill of the applicant in lading cargo and in handling and stowage of freight, and if for license as chief mate on ocean or coastwise steamers, or of sail vessels of over 700 tons, or as second or third mate of ocean or coastwise steamers, who shall have charge of a watch, shall also examine him as to his knowledge and ability in navigation and managing such vessels and all other duties pertaining to his station, and if satisfied of his qualifications and good character they shall grant him a license authorizing him to perform such duties for the term of five years upon the waters upon which he is found qualified to act; but such license shall be suspended or revoked upon satisfactory proof of bad conduct, intemperate habits, unskillfulness, or want of knowledge of the duties of his station or the willful violation of any provision of this title.'

"Sec. 4. That section 4417 of the revised statutes be, and is hereby, amended by adding thereto the words: 'The local inspectors shall, once

in every year, at least, or upon application in writing of the master or owner, carefully inspect the hull of each sail vessel of over 700 tons and all other vessels and barges of over 100 tons burden carrying passengers for hire within their respective districts, and shall satisfy themselves that every such vessel so submitted to their inspection is of a structure suitable for the service in which she is to be employed, has suitable accommodations for the crew, and is in a condition to warrant the belief that she may be used in navigation with safety to life.'

"Sec. 5. That this act shall take effect July 1, 1899."

AMONG THE MAGAZINES.

The February number of Cassier's Magazine contains the first of a series of articles by Commodore George W. Melville, engineer-in-chief of the United States navy; an article on pneumatic shop appliances in which ship yard tools are discussed; an article by Civil Engineer Stephen H. Terry on "The Ventilation of Steamships," and a portrait and biographical sketch of Charles H. Cramp.

In a most excellent symposium in its February number the Engineering Magazine includes "Readings From Experience in Naval Engineering" by Commodore George W. Melville; "The American Isthmus and the Interoceanic Canal," by W. Henry Hunter, and "The Mineral Resources of the Island of Cuba" by Jennings S. Cox, Jr.

The Pall Mall Magazine for February contains several features of interest to marine and naval men. Clark Russell's "The Ship—Her Story" and "Naval Heroes in Westminster Abbey" are continued, and there is a story entitled "The Wreck Shoal" by E. & H. Heron.

Review of Reviews presents in its February number instructive articles upon Cuba, the Philippines, the army signal corps in the war, volunteer war relief associations, federal taxation of interstate commerce, and several articles on expansion.

McClure's Magazine presents in its February number another paper by Capt. A. T. Mahan, an instructive article on the Holland submarine boat, and Rudyard Kipling's remarkable poem "The White Man's Burden."

TORPEDO BOAT BAILEY.

In all probability the next launch of a United States torpedo boat will take place at the yard of the Gas Engine & Power Co. and Seabury & Co., Consolidated, Morris Heights, N. Y., where the Bailey is building. The vessel will slide into the water as soon as the Harlem river is free from ice. The engines are well under way but will not be placed in the vessel until after she is launched. It is expected that the official trial trip will take place about April 1. The Bailey is one of the three \$250,000 torpedo boats, for which provision was made at the last session of congress. She is 205 feet in length, 19 feet beam, and 13½ feet depth of hold. The builders have great hopes of the speed which the vessel will develop. Her engines are of the four-cylinder triple expansion type, developing 5,600 horse power and are expected to make about 400 revolutions per minute. Steam will be furnished by four water tube boilers at a pressure of 250 pounds. The builders are confident that the Bailey will show a speed of 33 knots.

NAVAL ARCHITECTS AND MARINE ENGINEERS.

In a letter to members of the Society of Naval Architects and Marine Engineers, Secretary Francis T. Bowles of 12 West Thirty-first street, New York, says:

"The executive committee invites correspondence as to papers to be read at the seventh annual meeting in November next. It is necessary for intelligent discussion that papers should be in print thirty days before the meeting, and, therefore, members who desire to submit papers or who have suggestions to make are requested to communicate with the secretary at their earliest convenience. The following resolution was unanimously adopted at the sixth annual meeting: 'That papers be invited upon the subject of life saving at sea for the next annual meeting, and that two such papers be selected by the executive committee for publication and discussion.' Members are invited to suggest names of persons outside the society who might be asked to prepare papers on this subject."

The Jackson Transit Co. is the name of a corporation organized for the operation of the steel steamer Samuel Mitchell and wooden consort Chickamauga, managed in the office of W. C. Richardson, Cleveland. The name Jackson was selected on account of the Jackson iron mine of Michigan having been controlled for a great number of years by officers of the Cleveland Rolling Mill Co., who are extensive stockholders in these vessels. The steamers Parks Foster and Ira Owen of the Owen Steamship Line will also be handled in the office of W. C. Richardson, under the direction of Mr. Parks Foster of Elyria, who was recently made general manager of the Owen company.

Sales of vessel property reported within the past few days on the lakes are: Steamer Petoskey from Northern Michigan Transportation Co. of Chicago, to Hart Line of Green Bay, Wis., \$45,000; steamer Carlos Reitz and barges Agnes L. Potter and John Mark (lumber tow), from Nesson & Dovel to R. G. Peters Salt & Lumber Co. of Manistee, Mich.; steamer Luella H. Worthington and consorts D. R. Martin and J. B. Wilbur to Capt. Samuel Chamberlain, last season in command of the steamer Escanaba.

The Youghiogeny & Lehigh Coal Co. of Chicago, has purchased the dock and steamboat fueling business of the O. S. Richardson Coal Co. The latter company retires entirely from lake business. The Youghiogeny & Lehigh company is a part of the extensive soft coal producing, selling and shipping interests managed by G. E. Tener and John A. Donaldson of Cleveland, and which include the Pittsburg & Chicago Gas Coal Co. and Fairport & Northwestern Dock Co.

Advertisements elsewhere in this issue from Lieut. Col. W. A. Jones, United States light-house engineer at Baltimore, call for bids on the erection of a light-house at Hooper Island, Md.

MARINE REVIEW

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A great many arguments have been brought forth of late with a view to proving that neither foreign nor American marine insurance companies could continue hull business, especially on the great lakes, under the liberal form of policy and low rates of premium that have prevailed for some time past. It was said not long ago, for instance, that the Insurance Company of North America was the only big American company remaining in the lake business. Other leading companies had gradually dropped out on account of heavy losses from year to year. Now we find published in England, and in New York in connection with the meeting of underwriters there last week, a statement showing losses in the marine business of the Insurance Company of North America for the past six years aggregating \$1,186,064. In the five years, 1893 to 1897 inclusive, this company's losses in marine business are said to have aggregated \$1,127,452, or an average of \$225,490 per year. The statement is as follows: 1893—Outgo, \$2,138,377; income, \$1,861,711; loss, \$276,666. 1894—Outgo, \$1,888,132; income, \$1,787,959; loss, \$100,173. 1895—Outgo, \$2,138,609; income, \$1,624,792; loss, \$513,817. 1896—Outgo, \$1,649,818; income, \$1,562,938; loss, \$86,881. 1897—Outgo, \$1,805,646; income, \$1,655,731; loss, \$149,915. 1898—Outgo, \$1,909,833; income, \$1,851,225; loss \$58,612.

The proposition to establish a department of commerce and industries, which originated some time ago with the vessel interests, on account of the large number of bureaus dealing with ships that are considerable of a burthen in the treasury department, will gain strength on account of the development of exports since the late war. The executive committee of the National Business League has taken the matter up, and has mailed to the interstate and foreign commerce committee of the house a large number of letters on the subject from business men residing in thirty-four states. Accompanying the letters was a communication from the executive committee expressing their conviction that "the prospective extension of our commerce to new peoples, living under diverse climatic and industrial conditions, producing largely, but from undeveloped soil and with primitive instrumentalities, has greatly emphasized the demand of the business men of the country that commerce and industry should have a department of their own, with a representative in the cabinet, in order that they may be properly systematized and the legitimate fruits of American enterprise may be adequately gathered."

At the recent annual meeting of the board of supervising inspectors of steam vessels in Washington the question of the sale of pilots' and engineers' licenses was taken up, and provision will very probably be made shortly for the prosecution, with severe penalties, of anyone connected with the sale or purchase of a license. It is a fact that there has been absolute proof of late of the illegal use of licenses, especially in the newly developed Alaskan district. Unfortunately there is no law providing for the punishment of an engineer or pilot who would be unscrupulous enough to dispose of his license in this way, or at least the laws bearing on the matter are very indefinite. It is now proposed to have the law so amended as to apply not only to the steamboat officer selling his license, but also to anyone found holding or using such a document without having come into possession of it in accordance with law.

After considerable effort on the part of officials of the Lake Carriers' Association, there is reasonable assurance that some of the private lights in the St. Mary's river will be replaced next season, even at the opening of navigation, by gas buoys. The representatives of the vessel men started in by trying to assist the light-house officials in the matter of getting a new tender for light-house service on the lakes, and it is quite probable that an appropriation for this vessel will be contained in the sundry civil bill. Commander Ackley, naval secretary of the light-house board, now informs Secretary Keep of the Lake Carriers' that at the opening of navigation the board will probably be able to add six gas buoys to those already established in the waters between Lake Huron and Lake Superior, and certainly will be able to place the four asked for to mark the rock cut near Sailors' Encampment.

As had been expected, there is now no hope in Canadian marine circles of the completion of St. Lawrence canal improvements during the latter part of the present year. Fourteen feet navigation is not now to be had until the spring of 1900. The latest report from Ottawa is that the contractors who are unable to push the Galoup rapids canal have laid the causes of delay before the government, and are now granted an extension of time until the spring of 1900 to complete the work.

The latest statistics of the pig iron industry show that capacity at works among the coke furnaces declined 4,800 tons per week during January, which is somewhat of a surprise. Stocks show a further decline of about 37,000 tons during January. However, preparations now being made will soon develop productive capacity.

A topographical model of the Chicago drainage canal may be one of the features of the United States civil engineering exhibit at the Paris Exposition.

STATUS OF THE SHIPPING BILL.

A Washington correspondent, who seems to keep in touch with matters affecting the proposed shipping legislation in Washington, says:

"It is now more certain than ever that Chairman Cannon of the house committee on appropriations spoke only for himself in announcing the other day that the Nicaragua canal bill and the Hanna-Payne shipping bill could not be considered by congress at the present session. There was a belief at the time that he spoke for Speaker Reed. As a matter of fact, Mr. Cannon is opposed to the Hanna-Payne bill, just as he was opposed to the Farquhar tonnage bill nine years ago, and he takes pride, to this day, for having defeated that bill at that time. Had the Farquhar shipping bill passed in 1891, when it was beaten by only three votes in the house, it is more than likely that there would have been an American merchant marine on the seas so large last year as to have demonstrated to Spain the utter futility of attempting to cope with the United States in any war. Unquestionably, there would have been a large increase in the tonnage under the American flag in the foreign trade had the Farquhar bill passed—enough, some think, to have secured the carrying of all our increased foreign commerce, and that of itself would have been at least twice as much as American ships carry now.

"Chairman Sereno E. Payne is as serene and confident of getting a rule from the speaker for the consideration of his shipping bill as a man well could be. He acknowledges that the big appropriation bills must have right of way, but he is waiting for a time when he can gain the hours he needs for the consideration of the measure. Representative Hepburn says he is determined to put his Nicaragua bill through, and he will defy the speaker. Meanwhile the speaker preserves his equanimity and his inscrutability. Whether he is opposed to the Hanna-Payne shipping bill no one knows; some suspect that he is, and others hotly deny it. It is believed on all sides, however, that he is bitterly opposed to the Nicaragua canal bill, and there are those who say that Chairman Cannon took advantage of the speaker's hostility to the Nicaragua and his own (Cannon's) opposition to the Hanna-Payne shipping bill to link the two together.

"To just what extent Chairman Frye of the senate committee on commerce will allow the river and harbor appropriation bill to get out of his control, in advance of the consideration of the Hanna-Payne shipping bill in the senate, no man has been able to determine. Members interested in the passage of the river and harbor improvements measure are beginning to hope that the Hanna-Payne shipping bill may be gotten out of the way so that their bill can pass. Some pretty fine political combinations are looked for on the Nicaragua and shipping bills before the session ends."

A FAMOUS ALASKAN STEAMER.

An inadvertance on the part of the Review in stating in a recent issue that the Alaskan steamer Willie Irving was built at Victoria, B. C., has served to bring to us some interesting details regarding this successful little steamer from Capt. Joseph Supple of Portland, Ore., who deserves the credit for the construction of the Irving. Mr. Supple states that the Irving was constructed at his yard a year ago, and was put up and then "knocked down" so thoroughly that when packed for shipment there was no piece of material that exceeded 24 feet in length and no piece or bundle that could not be carried by one man. The materials used in the construction of the hull were all Oregon products.

The engines, which are of the double-ported balanced-piston valve type, designed, built and fitted out for 250 pounds working pressure, were built by the Marine Iron Works, Chicago, the well known builders of marine engines, boilers, steam launches, steam yachts and tug boats. The boiler is of the Roberts water tube pattern, and both engines and boiler were constructed in sections, it being necessary to transport the whole equipment to Lake Bennett, where the vessel was erected and launched. The Willie Irving is a stern-wheel steamer, 80 feet long by 20 feet beam, and was built for Capt. E. W. Spencer of Portland, one of the best known steamboat men on the coast. In speaking of the vessel a few days ago Manager W. G. Nourse of the Marine Iron Works said: "It was the completeness of the work, hull, machinery and accessories, coupled with the very thorough practical experience that Capt. Spencer injected into the enterprise that made the Irving a record-breaker and so phenomenal a success, not only from a financial, but from an engineering standpoint as well. Capt. Spencer himself took her out of Lake Bennett and with her made the pioneer trip through to Dawson. He then sold the vessel at a high figure."

Mr. Supple says in a letter to the Review that he feels certain that the report that the Irving had gross receipts of \$127,668 in ten trips last year is not in the least exaggerated. He says: "It is no wonder that the British Columbia people like to claim the nativity of the Willie Irving. She was the most successful boat on the upper Yukon, competing with several Canadian-built craft. She made the trip from Dawson to White Horse Rapids in seven days. The best the Canadian boats could do was to make it in nine days."

TWO ELEGANT LAKE CHARTS.

Two of the finest lake charts as yet issued, both of them in colors, have just been published by the United States army engineers. One of them covers, on a large scale, the St. Mary's river from the canals down to Twin islands in Mud lake and the other is a general chart of Lake Michigan on one sheet. The few vessel masters who have seen these charts—they have been on sale for only a week past—are delighted with them. The engineers have been at work on resurveys connected with the making of these charts for several years past, and they are corrected in every detail up to date. The river chart will be known as St. Mary's river chart No. 2. It takes in both channels, old and new, and everything about it is as clear as book print. The same is true of the Lake Michigan chart, which extends well across the Straits of Mackinac. The Sault river chart may be had at 50 cents and the Lake Michigan chart at 75 cents from Marine Review Pub. Co., Cleveland.

Rodman E. Griscom, son of President Griscom of the American line, and acting manager of the Philadelphia office, has been unanimously elected a member of the board of directors of the Philadelphia Maritime Exchange.

ALBANY AND NEW ORLEANS.

THE INITIAL FOREIGN-BUILT VESSELS IN THE UNITED STATES NAVY—THEIR
VALUE AS OBJECT LESSONS OF BRITISH PRACTICE IN THE
CONSTRUCTION OF CRUISERS.

The recent launch at the yard of Armstrong, Whitworth & Co. at Elswick, England, of the cruiser Albany, building for the United States government, has served to again call attention in marine and naval circles to this vessel and her sister ship the New Orleans, which has been in commission for some time. These are vessels purchased during the late war. There is not in the navy of the United States any other vessels of exactly similar type, and the armament of these British-built cruisers is also in the nature of a decided innovation to American naval men.

The Albany and New Orleans, which are exactly identical in almost every particular, are classed as unarmored steel vessels—protected cruisers sheathed with wood. They are each 358 feet over all, 330 feet on the water line, 43 feet 9 inches beam, 16 feet 10 inches depth and of 3,437 tons displacement. Tonnage is 2,174 gross or 1,224 net, and their 7,500 maximum indicated horse power gives them a speed of 20 knots. The normal

The propelling machinery, being built for the Albany by Messrs. Hawthorn, Leslie & Co., Ltd., at their St. Peter's works, consists of two sets of triple-expansion engines, driving twin screws, the maximum indicated horse power being 7,500 at 160 revolutions per minute. The diameter of the high pressure cylinder is 31 inches, intermediate 46 inches, and the low pressure 70 inches, the stroke of all being 30 inches. The propellers are of composition, three-bladed, the blades being separate and secured to the hub by bolts. The diameter of propellers is 12 feet, and the pitch 15 feet 9 inches, buriable 1 foot in either direction. The total area of the three blades is 40 square feet. The air pumps are worked off the low pressure cross head, the circulating pump being of the cylindrical type, worked by an independent engine. There are two main condensers, each having a total cooling surface of 4,500 square feet. The air pumps are 22 inches in diameter by 14 inches stroke. The main engines are placed abreast of each other, and are separated by a water tight fore-and-aft bulkhead. In the starboard engine room there is an auxiliary condenser, with a centrifugal circulating pump and vertical air pump, worked by a common engine, for the use of the auxiliary machinery in port. There are four double-ended Scotch boilers, each 12 feet 3 inches in diameter and 18 feet long, with three furnaces at each end; the boilers being placed in two water tight compartments, with fire rooms at each end. The steam



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United States Cruiser New Orleans—Sister-ship of the Albany, Recently Launched at Elswick, England.

coal capacity is 700 tons and the bunker capacity 800 tons. The maximum draught aft at the lowest point of keel, with the ship ready for sea with bunkers full, is 20 feet 2 inches.

These vessels have protected steel decks, extending fore and aft from stem to stern, and are fitted with fourteen water tight bulkheads extending up to the berth deck. In addition to these sub-divisions there are double bottoms, minutely subdivided into water tight compartments, and the store rooms and coal bunkers below the protected deck are also water tight. The protective deck is $1\frac{1}{4}$ inches thick on the flat and at the ends, and $3\frac{1}{2}$ inches thick on the slopes for the length of the machinery and magazines, with 4-inch glacia plates around the funnel hatches.

Interest felt in these cruisers in the United States has been especially manifest in the matter of armament, which some naval officers have declared is superior to that to be found on any similar vessels in our navy. The main battery consists of six 6-inch rapid-fire guns—one on the poop, one on the forecastle and four on the broadsides—and four 4.7-inch quick-firing guns on the broadsides. The secondary battery consists of ten 6-pounder, rapid-fire guns, two under the forecastle, two under the poop, two on the forecastle, two on the poop and two on the bulwarks; four 1-pounder, rapid-fire guns in the lower tops, four Maxim guns in the upper tops, two 2-pounder field guns and three torpedo tubes. The field guns are for use in the boats and in landing. As indicated by the accompanying illustration, there are two military masts with two tops in each mast.

pressure is 155 pounds to the square inch. There are eight forced draft blowers for the purpose of supplying air to the furnaces when the fire rooms are closed. The total grate surface is 468 square feet and the total heating surface 13,156 square feet. There is one main feed and one auxiliary feed pump in each boiler compartment. Half of the double bottom under each of the boiler compartments is fitted for use as a reserve feed-water tank. In each engine room there is one auxiliary pump for use on the bilges, fire main, and water surface. In addition to the above, the vessel is lighted by electricity, the plant consisting of three dynamos and engines. There is also a distilling plant, with a capacity of about fifty tons per day. There is a steam capstan and steam steering engine, and there are ventilating blowers and ash hoists.

Both cruisers, it will be remembered, were purchased from the Brazilian government on March 16, 1898, just at the opening of the Spanish-American war. The representatives of the United States did not wish to purchase the Albany (then the *Almirante Abreuall* of the Brazilian navy) for the reason that she was not near completion, but Brazil would not sell unless both vessels were taken, and this government was very desirous of securing the cruiser which is now the New Orleans. The latter vessel went into commission two days after the date of sale, having been launched on Dec. 4, 1896, and came at once to this country where she was in service throughout the war. The Albany, having been launched Jan. 14, will probably be ready in a short time for her trial trip. The complement of each vessel is 24 officers and 383 men.

CHARLES CRAMP ON WAGES.

SENIOR MEMBER OF THE PHILADELPHIA SHIP BUILDING COMPANY COMPARES WAGES IN SHIP YARDS OF GREAT BRITAIN AND AMERICA.

During the recent discussion of the Hanna-Payne bill before the house committee on merchant marine and fisheries, a letter was read from Mr. Charles H. Cramp of the Wm. Cramp & Sons Co. of Philadelphia, on the subject of the comparative costs of ship building in Great Britain and America. Mr. Cramp says:

"In connection with the relative cost of building ships in this country and in Europe, particularly in Great Britain, the mere statement of the fact that materials are as cheap here as they are abroad is misleading and no sound calculation can be based upon it. It is true that shapes and plates, which are the principal materials of hull construction, can be purchased about as cheaply here as anywhere abroad, but though these materials—that is to say, plates, angles, beams, etc.—enter largely into the hull, there are many other materials necessary to its construction, and the same condition does not apply to these last-named materials as to the former; but by far the greater fraction of the actual cost of the hull of a ship is in the labor required to put the materials together, and on the basis of labor wages in this country if we put material—that is to say, shapes and plates—at 1½ cents per pound, the cost of putting it together will make that part of the hull—that is, shapes and plates—alone cost at least 5 cents per pound by the time it is ready to launch.

"Of course the figures here given are the average of the most economical kind of construction. In other words the minimum in all respects. Now, if we take the cost of the metal part of the hull ready to launch at 5 cents per pound, labor and materials together, and deduct 1½ cents per pound as the cost of the materials raw, we shall see that the cost of the labor alone is, say, 3½ cents per pound. This, as I have already said, is the absolute minimum, and is not often realized in ship building experience. Now, let us suppose that we have a ship of 5,000 tons; the plates and shapes of the hull will weigh about 2,150 tons, so that this steel material, at an average cost of \$30 per ton, would be about \$64,000 to \$65,000. But, if we take that same weight (2,150 tons) and compute the cost of labor in putting it together at 3½ cents per pound we shall have a labor cost on this part of the hull of about \$168,000 to \$170,000, as against about \$65,000 for raw materials. This, of course, for a ship built in the United States. It is therefore clearly apparent that the cost of raw material bears but a comparatively small proportion to the cost of labor employed in putting it together into the form of a ship's hull.

"Let us suppose the same ship built in Great Britain and that the cost of the materials in the two countries would be the same; that is to say, the 2,150 tons of plates and shapes going into the hull would be, say, \$65,000 in each country. We then have to deal with the \$170,000 worth of labor. In order to show what the difference would be in this respect I offer herewith a table of relative wages in this country and Great Britain compiled about four years ago at my request and for my use by a well-known English naval architect and ship builder. It is as follows, and there has not been since that time any reduction in American wages or an appreciation in English wages sufficient to alter its relative accuracy:

Trade.	Per week.	
	British rate.	American rate.
Pattern makers.....	\$9.00	\$18.00
Machinists.....	8.50	15.00
Riveters.....	7.50	12.00
Calkers and chippers.....	7.80	15.00
Beam and angle smiths.....	8.40	15.00
Holders-on.....	4.20	9.00
Fitters-up.....	7.80	15.00
Ship carpenters.....	9.60	18.00
Joiners.....	9.00	16.50
Painters.....	9.60	18.00
Shipshed machine men.....	7.20	15.00
Furnace men.....	6.00	10.80
Riggers.....	7.20	11.00
Plumbers.....	9.60	19.50
Drillers.....	6.40	11.00
Sheet-iron workers.....	8.50	15.00
Coppersmiths.....	8.60	18.00
Molders, iron.....	9.00	14.50
Molders, brass.....	9.00	15.00
Laborers.....	4.20	\$8.00-9.00

"It will be seen that the wages of the different trades engaged in ship building as between Great Britain and American yards average from 30 to 40 per cent less there than here; but in order not to take undue advantage of the argument let us say that the general average of difference is as \$1 for the American workman to 70 cents for the English workman in the labor that builds the steel hull. The difference is really somewhat greater than that, but we will take that for convenience. Now we have seen that the labor in putting this American metal hull together costs, say, \$.70,000; seven-tenths of that, which would be the approximate British rate, would be \$119,000. Subtract \$119,000 from \$170,000 and you get a difference at once of, say, \$57,000 in the cost of the labor required to put that part of the hull together.

"As I said before, the difference would be actually more than that, because the English ship yards not only have the advantage of cheaper labor in the proportion that I have stated, or more if anything, but they also have additional advantage of a system of practice by means of which they put even less of their cheaper labor than we do of our dearer labor on the same ship. However, leaving this out of the question, we have in the actual cost of the hull of this 5,000 ton ship, embodying 2,150 tons of materials, the following totals:

American cost, steel..... \$65,000
Labor in putting it together..... 170,000

Total..... 235,000

For the English ship, steel..... 65,000
Labor in putting it together in the form of a hull..... 119,000

Total..... 184,000

"In other words, the steel hull of a similar ship (that is, for practically a ship of equal earning capacity) built in this country would cost \$235,000 American as against \$184,000 English. It must be borne in mind that the metal structure of the hull, composed of shapes and plates, is only part of the material and labor involved. The ship carpenter and joiner work, plumbing, equipment, and outfit, and above all the propelling and auxiliary machinery, cost always and under all conditions more when made by American than English labor. However, a more comprehensive and intelligible exhibit would be that of comparing the relative costs of material and labor as between the two countries in the largest and most modern type of commercial vessel. In a recent case the relationship between labor and materials in the whole cost of the vessel, including machinery, outfit, etc., an English-built ship of 12,000 tons, would be as follows:

Total cost of materials..... £177,000
Total cost of labor..... 91,000

Total cost of ship..... 268,000

"From this it appears that of the whole cost of the vessel, finished and ready for service 66.7 per cent was represented by materials and 33.3 per cent by labor. In the cost of a 12,000-ton ship of similar built in this country, the relationship of material to labor in the whole cost of the ship would be almost exactly 50 per cent for each; in other words equally divided. But it must be further borne in mind that the comparison of the two costs, namely, that of material and that of labor in the English ship as contrasted with the same comparison in the American ship, shows very closely the actual, or, in other words, the financial difference between the effect of English wage rates and American wage rates on the conditions of the same or similar industry.

"In the English case the materials cost about 29 per cent more than the labor. In the American case the labor cost is as much as the material, in both cases taking the cost of the finished ship as a whole. Therefore it is obvious that if the cost of materials in both countries be approximately equal, the English employer of ship building labor will have an advantage over his American rival equal to 29 per cent, which is another form of demonstrating the preceding statement, based upon the comparative wage rates, that the wages of different ship building trades range from 30 to 40 per cent less in England than in the United States.

"Manifestly there can be no possibility of even competition in ship work under such conditions, and the inevitable conclusion is that either the higher wage rates in this country must be protected in some manner, or, if the field of competition is left entirely open, the industry in this country must succumb, because the disproportion in labor cost is too great to be met by any kind of unprotected exertion. I am well aware that none of the things I have stated above are new; all of them are facts well known to everyone who has anything to do with building ships or buying them.

"The only way in which congress could possibly provide against or overcome this discrepancy in first cost, which is inevitably caused by the difference in labor wages above stated, would be by legislating to abolish such inequality; in other words, by passing laws to make American workmen in the ship building trades work for the same wages that men working at similar trades in England are contented to receive. Of course this is rankly absurd, but it is necessary to put it in this form in order to show the utter fallacy of the doctrine so often put forth by those who believe that American ships should not be protected in any manner and who preach that if our navigation laws were repealed, leaving our market open to ships built anywhere in the world, that the American ship building industry would continue to exist."

NORTHWESTERN GRAIN AND COAL MATTERS.

Duluth, Minn., Feb. 22.—The principal topic of conversation among vessel men and grain shippers here for some time past has been the proposed new grain bill of lading, which is to be fixed at the conference to be held in Buffalo March 7 to 9. It is the general opinion that the grain interests will make decided objection to any change in the present bill. The freight outlook is well discussed in the following letter, sent out recently by one of the vessel agencies:

"The grain in store in the Duluth and Superior elevators, a few days ago, exceeded by 4,000,000 bushels the quantity in store at the same period 1898. The following figures indicate the situation now and then:

	1898	1899
Wheat	2,483,104	6,257,272
Barley	591,903	357,528
Flax	627,186	1,032,444
Oats	1,180,078	1,051,853
Rye	1,185,094	213,068
Corn	2,180,987	3,325,380
	8,448,352	12,237,545

"Notwithstanding the comparatively large quantity of grain in store here, there is absolutely no inquiry for tonnage. Primarily, this is due to the fact that the New York exporters seem to have a large amount of grain in store there, so they are able to meet foreign demands without coming into the western market. We have every reason to believe there is still a large quantity of grain in store in the northwest, so that stocks in store will be considerably augmented by the opening of navigation. Shippers advise us, however, that a considerable portion of corn will be carried until July, as there seems to be some profit in holding this grain in the elevators. We look to see oats, rye, flax and barley move promptly at the opening. Shippers of oats are preparing their grain to test 36 to 38 pounds.

"The movement of coal from the head of the lakes is the most active in the history of this port. Hard coal is being shipped at the rate of about 50,000 tons a month. The movement seems to be limited only by the ability to obtain cars. It is evident there will be a shortage in some grades of hard coal. So far as soft coal is concerned, it is probable that there will be more than enough to supply the requirements until the opening of navigation. From a vessel owner's standpoint, however, the coal situation is very satisfactory. Of course the protracted season of cold weather has created plenty of ice. It is still too early to predict a late opening, but there is much more ice in the harbor at the present time than was the case a year ago."

NAVY YARD IMPROVEMENTS.

OUTLINE OF THE WORK AT THE UNITED STATES NAVAL STATIONS TO BE COVERED BY THE APPROPRIATIONS IN THE NAVY BILL NOW BEFORE CONGRESS—PLEA FOR EXTENSIVE IMPROVEMENTS ON THE PACIFIC COAST.

The new naval appropriation bill, now before Congress, and a resume of which was presented in the last issue of the Review, makes provision for improvements of quite extensive character at the various United States naval stations. For the Portsmouth (N. H.) navy yard estimates are submitted for the erection of a sawmill, foundry, plate, angle and beam shed; for an electric plant to cost in the neighborhood of \$50,000, and for buildings for the stowage of coal and coal handling machinery with a view of providing for a supply of 10,000 tons. A similar coal handling plant is desired for the Boston navy yard, and a new railroad system is suggested. An appropriation of \$100,000 is desired for the construction of new wharves, the extension of old ones and dredging. The only work needed at the station at New London, Conn., is dredging in front of the wharf.

Improvements proposed for the New York yard will, if carried out as planned, prove quite expensive. It is proposed to enlarge the Whitney basin and open it to the Wallabout channel, which will increase the facilities for handling vessels; increase the storage capacity for provisions and supplies for naval vessels; construct three buildings for the bureau of steam engineering; installation of a modern plant for the storage and supply of coal and the improvement of the coal dock.

It is desired by the bureau of yards and docks that the entire Delaware water front of the League Island navy yard may be dredged to a depth of at least 28 feet at mean low water, with a limited area having a depth of 30 feet at mean low water for the accommodation of the heaviest vessels of the navy. It is claimed that the construction of another dry dock at this yard, for which congress has already made provision, makes it desirable that a 40-ton locomotive crane be provided and connected by tracks with both docks. A plate bending shop and a coal storing and handling plant are among other improvements planned. At the Washington navy yard the principal new work will be the erection of a construction and repair shop. Improvements at the Norfolk (Va.) station will, if the estimates go through as desired, be the most extensive in the country. The plans, which include the provision of a \$1,500,000 dry dock, a torpedo store house and floating derrick, will be treated at greater length in an early issue of the Review.

At Port Royal, S. C., new workshops are needed and considerable dredging is recommended. Improvements contemplated at Key West, Fla., are not of importance, but heavy expenditures are proposed at Mare island, Cal. New machine and repair shops will be erected and an appropriation of considerable size is asked for dredging.

A strong plea for the provision of adequate facilities on the Pacific coast is made by Commodore Mordecai T. Endicott, chief of the bureau of yards and docks, in his annual report, which has just become available. He says: "The western coast of the United States stretches from San Diego on the south to Puget sound on the north, a distance of 1,250 miles. The nation has one navy yard and one naval station upon this coast, the latter at its extreme northern limit. The navy yard at Mare island is south of central of this stretch, and lies upon waters connecting with the great San Francisco bay, upon which is situated the populous and wealthy city of San Francisco. Its general location is the best upon the Pacific coast from a strategic standpoint, and is an excellent one with reference to the markets for labor and supplies, upon which depend so much the efficient condition of the navy yard and its economic results, but it yet remains to be demonstrated that the selection of its precise situation upon Mare island strait was a fortunate one. No battleship or heavy-draft cruiser has yet approached its wharves, and while it is possible for one to do so under favorable conditions as to time and tide, it is not probable that the venture will be made until the physical state of the navigable channel between San Francisco bay and its docks is very materially improved.

"The Oregon, which was built in San Francisco, was not sent to the Mare island navy yard to fit for sea because of the risks of navigation, and was compelled to go to the Puget sound naval station, 800 miles north, to be docked. A dock of the largest class is projected for Mare island, and the navigation to it must be easy and safe at all times before it can be fully useful to the service. The government could construct the amplest docking facilities on San Francisco bay, but in any event this bay is 450 miles north of the southern limit of our territory on this coast, and it is quite as important to have a station for coal and repairs at this limit as at the northern one. While it may be in the distant future when so large a naval force is maintained on this coast as upon the Atlantic, it must be evident that the growing interests of the country upon the Pacific in Alaska, Hawaii, Samoa, and our own territory, and trade and other relations with the Pacific Central and South American countries will be attended with more of a naval establishment upon its shores than we have ever before maintained there, and in the event of complications requiring a demonstration of force, the dock yard establishment must be equal to the situation.

"If this nation shall own or control no waterway across the American isthmus, the necessity for the maintenance of a stronger naval force permanently assigned to these waters, to be ready for use at once, rather than depend upon the tardy transit of war vessels around Cape Horn, seems evident. I recommend that the subject of the establishment of a naval coaling and repair station upon or near the southern limit of our Pacific coast, and its definite location, be committed for study and report to a board of experienced and able officers, competent to properly weigh all the conditions that affect and enter into so important a problem."

THE CORPS OF CIVIL ENGINEERS.

Upon the subject of the corps of civil engineers Commodore Endicott says: "I beg to call the attention of the department and congress to the importance of an organization of the corps of civil engineers upon a somewhat different basis from that now existing. The corps as it exists at the date of this report numbers eighteen. All these belong to the one and only grade of full civil engineers. I think the manner of admission to the corps of civil engineers should be established by act of congress, and

that the requirement should be that appointments be made only after a competitive examination, if from civil life, or after careful selection, if from the naval academy. There should be added to the corps the grade of assistant civil engineer, in order that young men may be appointed to the lower grade first and be promoted to the grade of full civil engineer as vacancies occur in the latter, after some years of experience and after a further examination to test their fitness for such promotion.

"I would recommend that the number of assistant civil engineers be not fixed by law, but be variable, at the discretion of the president, to suit the requirements of the service. The corps as it now exists is not sufficiently large for the prosecution of the work of designing, constructing, and maintaining the public works in the navy without calling to its aid many young civil engineers from private life to temporary appointments at the various yards and stations, under various titles of draftsman, transitman, leveler, rodman, etc., who are paid from the appropriations made by congress for works of improvements upon which they are engaged. Such assistants, being commissioned officers, would have the requisite authority and status to perform any duty assigned to them in connection with public works, and take charge of the same and represent the civil engineer of the yard in his absence. There would also be the manifest advantage of having young officers in training in the subordinate grade in the line of public works under the cognizance of this bureau, to fit them in an especial degree for the vacancies occurring in the grade of civil engineer. Such commissioned officers would probably have a greater interest in the work than temporarily employed civilians, thus insuring a more efficient administration and better results. The introduction of such a grade would be without additional expense to the government, as its establishment would obviate the necessity of the employment of an equal number of young engineers under the several ratings mentioned above.

"The importance of some such reorganization has been laid before the department in previous years by a former chief of this bureau, Commodore N. H. Farquhar. At that time the proposition contemplated the selection of the appointees from graduates of the naval academy, who were to be selected from those showing an aptitude and preference for the profession of civil engineering. It was also contemplated that they should be given a post-graduate course in civil engineering at some engineering school of good repute in this country, and upon taking the degree of civil engineer from such institution they were to be detailed to the corps of civil engineers. At that time appointments were being made directly from civil life, frequently without any test as to the professional qualifications of the appointees, and it was deemed better that appointments should be made in the manner indicated above, in order to insure officers educated and qualified in the profession.

"Graduates of the naval academy, who have completed the two years' cruise and the final examination and are naturally fitted and inclined to become civil engineers, might be assigned about June 1 to duty under the civil engineer of some navy yard. After three months of such duty, if found qualified, the chief of the bureau of yards and docks would then recommend to the department that such officers be ordered to some engineering school to take such a post-graduate course of study as will fit them for the duties of a civil engineer in the navy. Upon the completion of such post-graduate course the officers would be commissioned assistant civil engineers. The chief of the bureau of yards and docks would recommend an engineering school, and have general supervision of the post-graduate course and of the officers while taking such course. During the past two years two examinations have been held for the purpose of admitting candidates to the corps. The results of the examinations have been entirely satisfactory, and capable and efficient men have been added to this branch of the service. If an examination of this kind were made obligatory by law, it would accomplish the purpose sought in selecting men from graduates of the naval academy, and it is earnestly requested that a law may be passed which will provide for admission to this corps in one or the other of the methods indicated."

WRECKING STEAMER SAGINAW.

Improvements made since the close of navigation in the wrecking steamer *Saginaw*, operated by Parker & Millen of Detroit, are of an important kind. Dead lights have all been taken out and she has been planked up solid, and a steel cord of $\frac{3}{4}$ inch thickness and 30 inches width has been worked in clear around the hull. There are also new frames and planking from engines aft. These repairs will increase the lightering capacity of the vessel to 20,000 bushels of grain. She is also provided with a Lidgerwood double hoist and self dumping buckets, with a crane of sufficient length to reach amidships of any vessel on which she may be engaged. When the *Saginaw* comes out in the spring, she will also be provided with a new electric lighting plant of sufficient capacity to light herself, and with the use of plug lights to light any wreck that she may be working on. With these general improvements, this vessel will be second to none for lightering, handling steam pumps and wrecking in general, and will be in fit condition to go anywhere on the lakes.

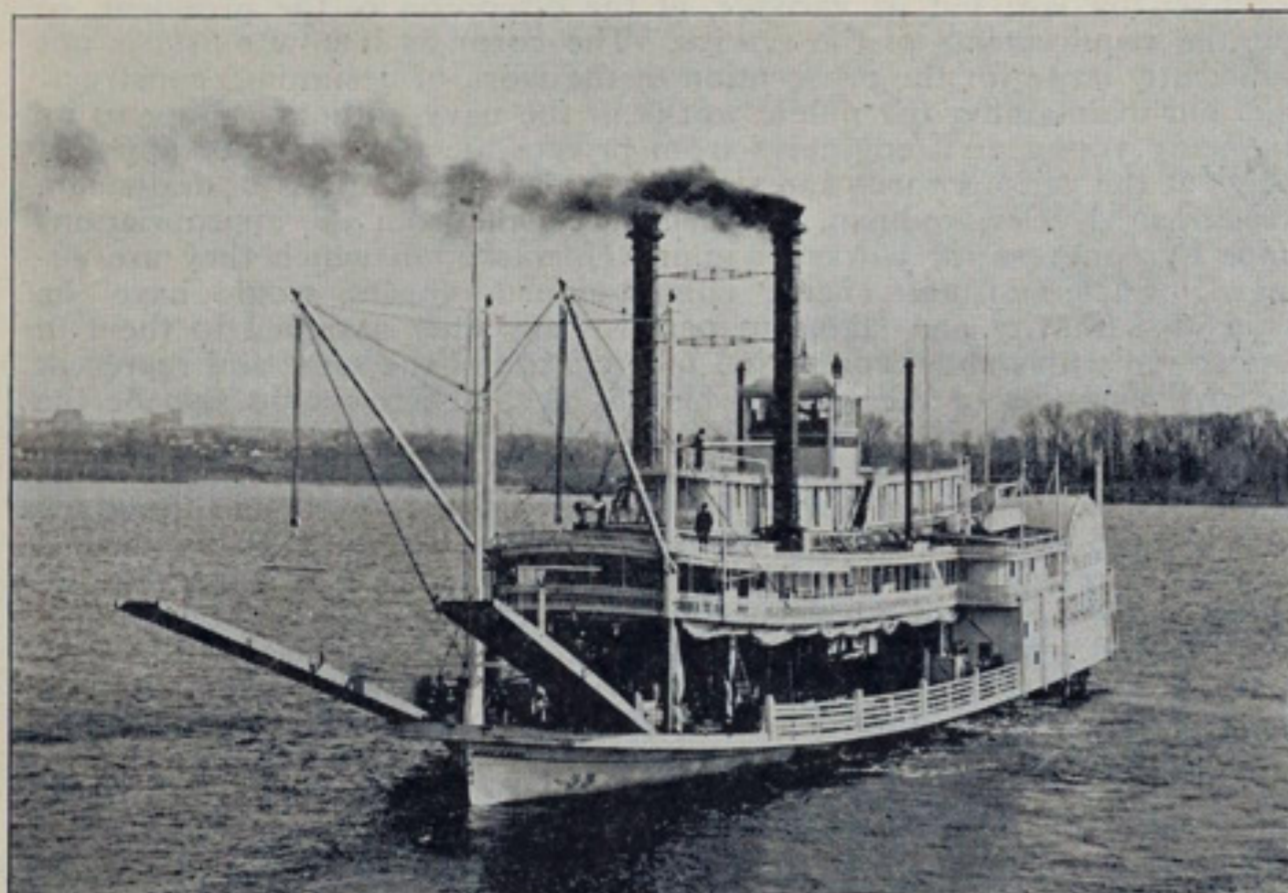
A hanger just issued by the Detroit Sheet Metal & Brass Works, marine hardware-manufacturers of Detroit, Mich., deals with all manner of locks, keys, fancy and special knobs, etc., for cabins, state rooms, toilet rooms, etc. These locks designed especially for ships, are known as Kirby locks and have been developed in connection with the construction of numerous elegant side-wheel passenger steamers in Detroit.

C. F. Giles, master mechanic of the Louisville & Nashville Railroad Co., writes H. G. Trout of Buffalo, highly commending a Trout wheel applied in July last to the steamer *Pensacola* at Pensacola, Fla. Mr. Giles refers to the wheel in acknowledging the receipt of a shaft for the same vessel, just furnished by H. G. Trout.

Miller, Bull & Knowlton, vessel owners of 130 Pearl street, New York, are said to be the purchasers of the Welland canal size steel freight steamer building at the works of the Craig Ship Building Co., Toledo. The name selected for the vessel is *Mae*. This steamer was described with plans in a recent issue of the Review.

A MODERN RIVER STEAMER.

The Review presents herewith a picture of the Belle of the Bends, the handsome new steamer of the Vicksburg & Greenville Packet Co. of Vicksburg, Va. The Belle, which was built by Capt. Ed. Howard, the well-known ship builder of Jeffersonville, Ind., is one of the most thoroughly modern vessels in the lower river service. She is 217 feet long, 32½ feet beam, 7 feet 4 inches depth of hold, and has 12-foot guards. Her



engines have cylinders 18 inches in diameter by 7 feet stroke, and steam is supplied from three boilers. The equipment includes a "doctor," and injectors to supply the boilers with water. A feature of the vessel is her electric plant, there being installed a direct connected engine and dynamo, furnished by the General Electric Co. There are incandescent lights in each stateroom, a 6,000-candle-power marine projector, 2,400-candle-power enclosed side lights and a 4,000-candle-power enclosed arc light in the deck room. The Vicksburg & Greenville Packet Co., which, by the way, operates a United States mail line, is officered by J. J. Powers, president; A. F. Nimtz, vice president; L. Hornthall, general freight and passenger agent; and C. H. Tracy, secretary.

CHICAGO TOOLS IN ALL PARTS OF THE WORLD.

Chicago, Ill., Feb. 22. Everybody in this country is pleased to hear of the sale of American tools, and American products of all kinds in fact, in European markets. The readers of trade journals, who are most interested in the development of our export trade, are not concerned particularly as to who makes these sales; satisfaction to them, as a rule, is in knowing that the foreign trade is expanding. This is why the Chicago Pneumatic Tool Co. has secured a great deal of valuable advertising through its extensive dealings with European ship builders. The success met with in the sale of these tools is certainly remarkable. The home office is just in receipt of a report from John Macdonald & Son of Glasgow, relative to an exhibition of the tools held in Glasgow, in Messrs. Muir & Findlay's Parkhead Boiler Works. There were exhibited the new Boyer hammers for chipping and calking, Boyer riveting hammers, Boyer riveter with pipe frame, Boyer deck riveter and pneumatic holder-on and Boyer casting cleaner, together with Whitelaw reversible drills and the chain hoist operated by Whitelaw motor. In their report regarding the exhibition, the Glasgow representatives say:

"We are pleased to state that all the tools worked admirably, and were a great surprise to all the gentlemen present, who expressed themselves highly satisfied, and at the same time admitted that the results obtained were far beyond their expectations. Among the firms represented were all the principal shipbuilders of the Clyde, railroads, locomotive builders, and a large number of engineers and boiler makers. The Boyer hammers we have had in use for some time in many of the leading works in Scotland, and we are glad to say that they are the only hammers in existence in which there is no vibration, this being the great objection to other hammers. The drills are also adopted in many places, and we find they are superior to any other pneumatic drills on the market, and for boring and tapping stay holes, etc. in marine boilers and other work, the firms using these inform us that they can get through their work in one fifth of the time formerly taken.

"The Whitelaw drills are certainly the cleverest and most useful tools that have come under our knowledge. With a No. 6 drill we bored a 3½-inch hole through a 6-inch wood sleeper in fifteen seconds. The larger drills having a reversible motion, are invaluable for tapping and staying boiler work. The No. 8 drill tapped 2½-inch stay tube hole through both plates of a marine boiler in about 2½ minutes, which was considered to be quite a feat. The deck riveter surprised everyone who saw it, owing to its being so easily handled, the total absence of vibration, and by the very speedy and efficient way in which it did its work. It does not require an experienced man to work it, and we are quite certain that this machine will form one of the principal tools in ship building yards in this country. With the pipe frame riveter we riveted 1-inch rivets at the rate of four seconds per rivet. We shall place a large number of these among the ship builders and others, as it was admitted by all to be the best and most efficient pneumatic riveter they had ever seen.

"The chain hoist, operated by air motor, is a very clever machine, and nothing has been seen here to approach it. It seems marvelous that such a small machine, weighing only forty pounds, should have lifted 1,500 pounds, and could have done more if the chain had been heavier. It lifted this weight as quickly and as easily as it did half that amount; in fact, one has to see this machine before they can realize its capability, and we are

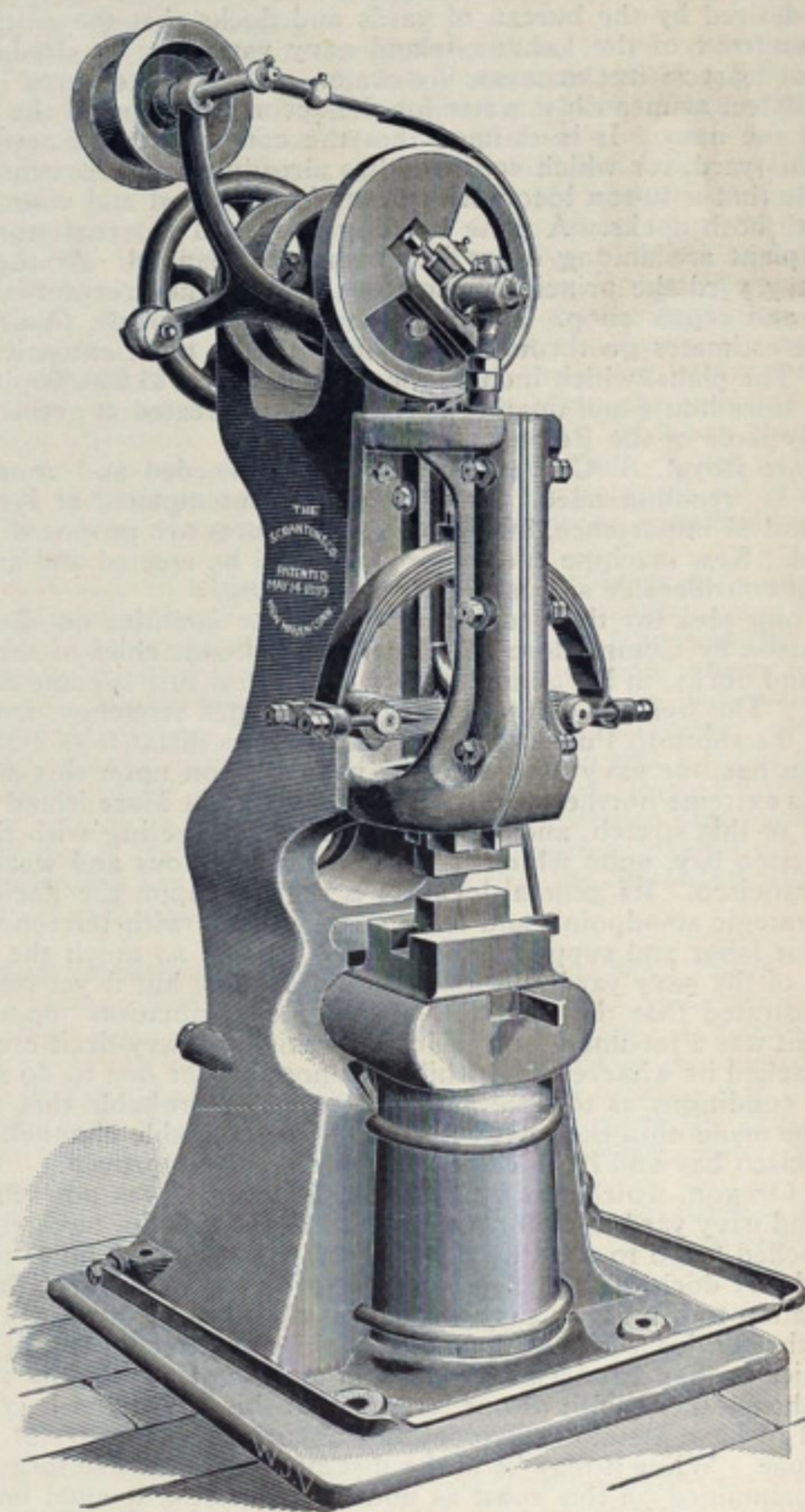
anxiously waiting on a stock of these hoists, as they are now largely in demand."

The Chicago company also has a letter from Mr. W. F. Dickson, chief engineer of the Sormovo Locomotive Co. in Russia, in regard to arranging for the sale of their specialties in that country. He says: "We have obtained such good results from the various Boyer tools in our shops, and they have attracted so much favorable comment, that a large business could be done with arrangements for proper representation here."

SCRANTON IMPROVED UPRIGHT POWER HAMMER.

The Scranton improved upright power hammer as manufactured by the Scranton & Co., New Haven, Conn., and herewith illustrated, is acknowledged to be one of the most practical power hammers made. When carefully considered from a mechanic's point of view it will be found that this hammer embraces many important features. The manufacturers call particular attention to the fact that they employ only the best of workmanship; use such material as has proved most satisfactory for the purpose, and build the hammer after a design that has proved generally satisfactory.

The hammer occupies but little space; requires little power and strikes a true and firm blow. The anvil is separated from the frame by strips of wood, and extends through the base of the frame, permitting it to rest on a wooden foundation, and receives the jar of the blow without transmitting this jar to the other parts of the hammer, causing bolts to granulate and small parts to break and get out of order. The hammer may be arranged so that the dies may key either from the front or side, as preferred, and as the power is applied from the top by means of a belt and idler, it



will be noticed that the belt is out of the way of the operator and does not accumulate grease and dust, which is the case with the belt reaching nearer the floor.

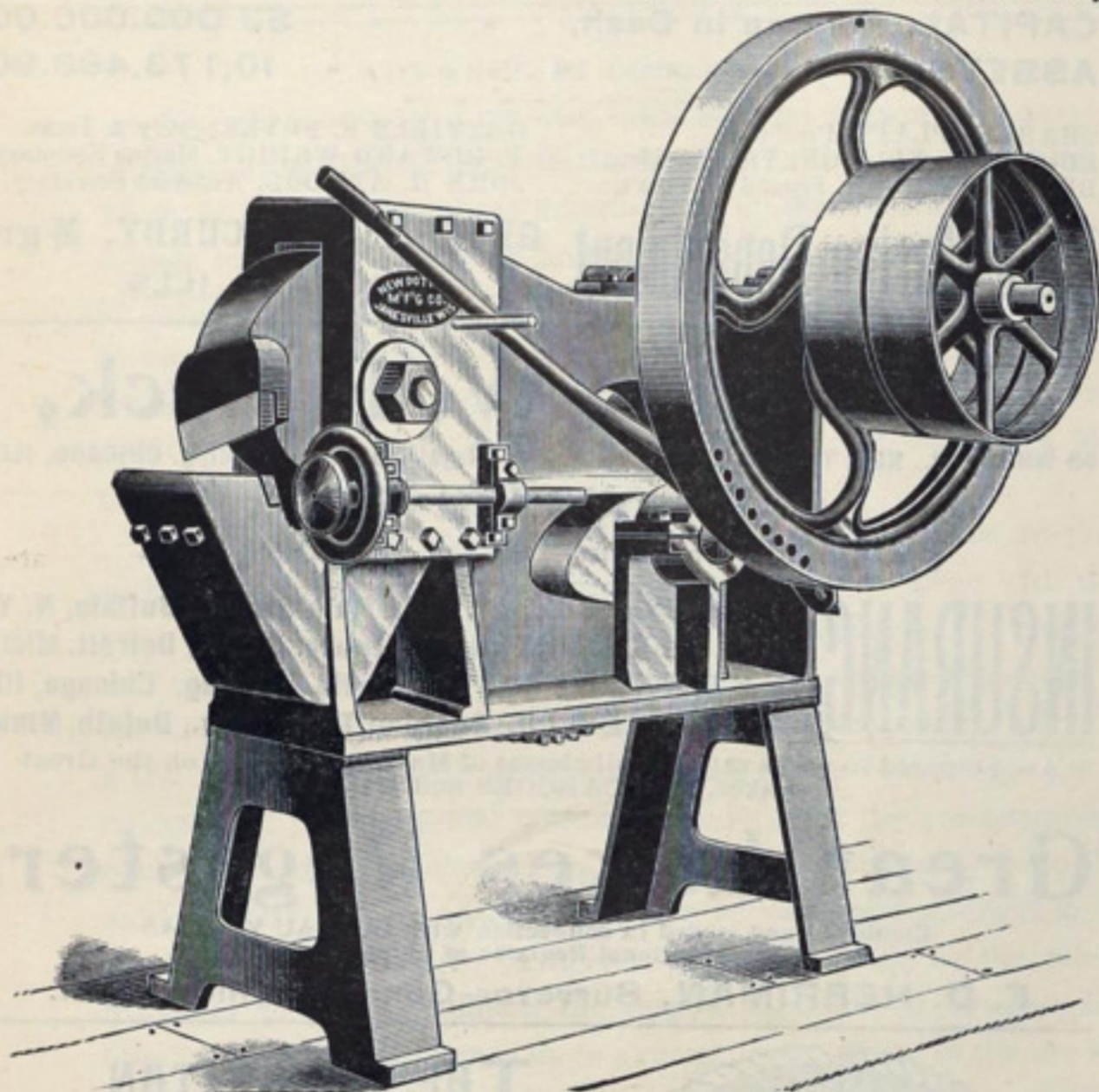
The manufacturers will be pleased to furnish their new circular, No. 25, with terms, to any one needing a power hammer, and to explain fully all features of this hammer, and aid their customers in every way to select a hammer best suited to their purpose. It is particularly requested with reference to inquiries, that the class of work for which hammers are required be stated, and that the sizes of stock to be used be given also as near as possible.

The contract for the new Boston dry dock has been awarded to O'Brien & Sheehan of New York city. The dock, which will be built of granite, will be 750 feet in length by 100 feet in width, clear inside measurement, with a depth of 30 feet. The bid on which the award was made was \$857,200. The lowest bidder for the electrical appliances was the Thresher Electric Co. of Dayton, O., at \$149,842.

Yarrow water tube boilers for the stern wheel steamer building by the James Rees & Sons Co. of Pittsburg, Pa., for the Canadian Development Co. of Lake Bennet, B. C., will be furnished by the W. & A. Fletcher Co., Hoboken, N. J.

BEVELING SHEAR FOR BOILER AND SHIP PLATES.

The accompanying illustration is of a shear designed especially for beveling boiler, ship, or other plates, built by the New Doty Mfg. Co., Janesville, Wis. The machine consists essentially of the main frame, in which is pivoted a lever operated by a cam, which is on a shaft driven by



means of the pulleys shown, through the medium of powerful gears. The motion of the machine is controlled by a clutch and the lever seen at the side.

Unlike the plate planer, this machine will, of course, bevel plates of almost any form, such as throat sheets, flanges of drums, plates bent to a circle or ship plates of any curve. Whatever tendency there may be to displacement of the work when being cut, is overcome by the stop shown at the side of the machine. The machines are made in two sizes, the smaller one capable of beveling sheets up to 1/2 inch thick, the larger one up to 1 inch thick.

TRADE NOTES.

A resumption of work has been effected at the works of the Hillman Ship & Engine Building Co., Philadelphia. A reorganization of the company has been made with J. J. Hillman, a son of the late Charles Hillman, as president.

A. J. Drexel of Philadelphia has instructed Scott & Co. of Greenock to proceed at once with the new steam yacht designed by G. L. Watson & Co. of Glasgow. Mr. Drexel's former yacht, the Margarita, it will be remembered was sold some time ago to the king of Belgium.

Mr. E. P. Mooney, for the past seven years connected with the Lehigh Valley railroad, as traveling engineer and master mechanic, and prior to that time, for twenty-four years, with the Lake Shore & Michigan Southern Railroad, as locomotive and traveling engineer, has severed his railroad connections to take charge of the Buffalo office of the Chicago Pneumatic Tool Company. Mr. Mooney has a wide acquaintance among railroad men, and with his well known push and energy will assuredly make a success in his new position, and still further increase the sales of the Chicago Pneumatic Tool Company in his territory.

Mr. H. F. J. Porter of the Bethlehem Iron Co. lectured to a large audience at a meeting of the Society of Arts, Massachusetts Institute of Technology, last Thursday evening. His subject was "Modern Forging" and he presented in a very interesting way, with numerous illustrations by the stereopticon, the methods in vogue at the Bethlehem works of forging such articles as hollow and solid shafts, dynamo field rings, guns, armor plate. Views were shown of the hollow shafts of the "Oregon" and of the "Brooklyn," made at these works. Defects in the old methods of forging and the steps leading to the present methods were well explained.

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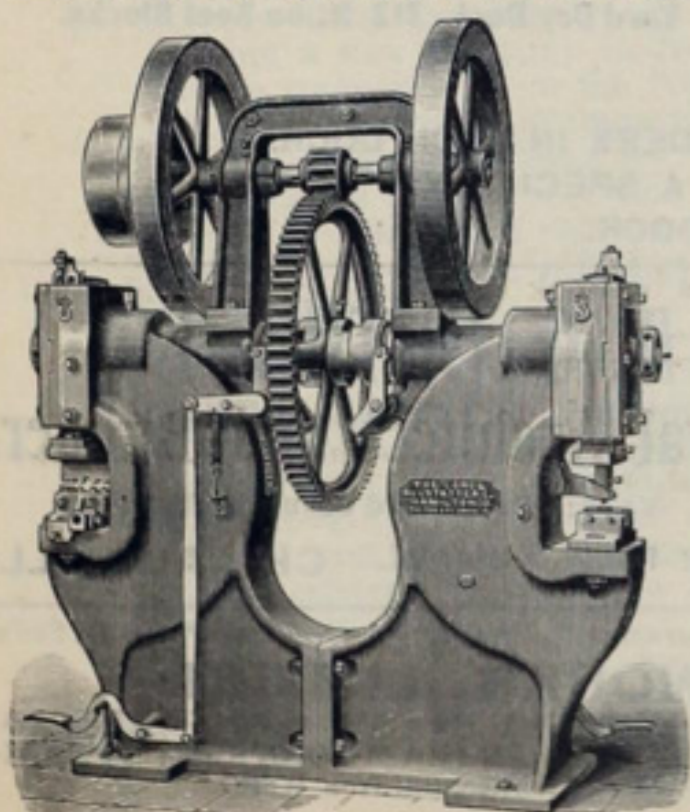
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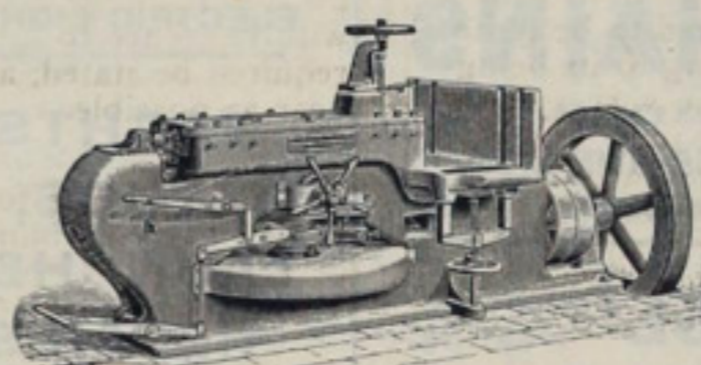
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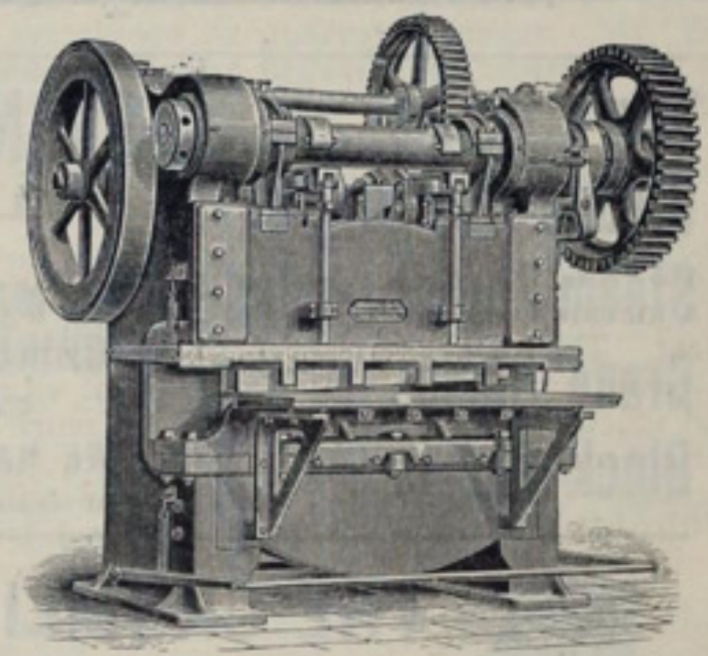
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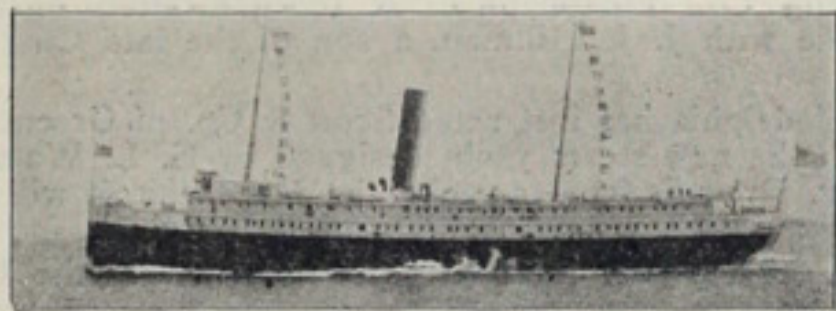
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